STUDIES ON THE NEMATODES OF WET-LANDS
(Order Mononchida)

M. PHIL. DISSERTATION

BY

WASIM AHMAD

DEPARTMENT OF ZOOLOGY
ALIGARH MUSLIM UNIVERSITY
ALIGARH

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DEPARTMENT OF ZOOLOGY
ALIGARH MUSLIM UNIVERSITY
ALIGARH., U. P. INDIA

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SUPERVISOR

This is to certify that the entire research work that has been presented in the dissertation entitled "Studies on the Nematodes of Wet-lands" by Mr. Wasim Ahmad is original and was carried out under my supervision. I have allowed Mr. Ahmad to submit it to the Aligarh Muslim University in partial fulfilment of the requirements for the degree of Master of Philosophy in Zoology.

(M. Shamim Jairajpuri)
Ph.D., D.Sc., F.Z.S.I.

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INTRODUCTION

The nematodes are slender, active worm-like creatures, constituting one of the most dominant groups among the soil-organisms. The soil nematodes are divided mainly into four categories, viz., phytophagous, predacious, microphagous and saprophagous. The former two groups are important from the point of view of agriculture. In the present work on the nematodes of wetlands, nematodes belonging to all the four above mentioned categories were obtained, but only one group namely predacious nematodes was selected for study. The others will be studied later.

The predacious nematodes mainly include mononchs, a group of nematodes belonging to the order Mononchida Jairajpuri, 1969. These nematodes could be easily distinguished from other nematodes by their large and slender bodies and heavily sclerotized buccal cavities. They voraciously feed upon other soil micro-organisms including nematodes. They either swallow the nematodes entire or may only rupture their cuticle to suck their body contents and thereby causing the death of the prey. A slight increase in the population of predacious nematodes may bring down the population level of phytophagous nematodes because of predation.

Bastian (1865) established the genus Mononchus and placed in it all the species of mononchs described till that

time. Cobb (1916, 1917) made valuable contributions to the morphology, biology and taxonomy of Mononchs. Micoletzky (1922) Wu & Hoeppli (1929), Chitwood (1937), De Coninck (1939), Altherr (1950, '53), Pennak (1953) and Andrassy (1958) have made useful contributions to this group. Clark (1960-63) in a series of papers described Mononchidae of New Zealand. Mulvey (1961-67) published reviews of genera of Mononchidae known till that time. Coetzee (1965-68) described mononchs from South Africa and Mulvey & Jensen (1967) from Nigeria. Jensen & Mulvey (1968) published a very useful paper on Mononchidae of Oregon.

In India the work on mononchs started rather late. Kannan (1960-61) reported few species from South India but described them very poorly. Jairajpuri and other (1969-79) published a series of papers on mononchs of India and also proposed the order Mononchida for this group of nematodes.

The present study is confined to the members of the genus Mylonchulus and Iotonchus although other genera of Mononchida were also collected. It provides description of two new species of Mylonchulus, viz., M. simlaensis n. sp. and M. ventralis n. sp. Redescriptions have been provided of Mylonchulus mulveyi Jairajpuri, 1970; M. brachyuris (Butschli, 1873) Andrassy, 1958; M. hawaiiensis (Cassidy, 1931) Andrassy, 1958; M. contractus Jairajpuri, 1970; M. dentatus Jairajpuri, 1970; M. sigmaturus

(Cobb, 1917) Altherr, 1953; M. lacustris (N. A. Cobb in M. V. Cobb, 1915) Andrassy, 1958; M. muradi Jairajpuri, 1970; M. index (Cobb, 1916) Andrassy, 1958; Iotonchus indicus Jairajpuri, 1969; I. parabasidontus Mulvey & Jensen, 1967; I. trichurus (Cobb, 1917) Andrassy, 1958; I. jairi (Lordello, 1958) Clark, 1960. The male of M. mulveyi is reported for the first time. A list of species of Mononchida other than those belonging to Mylonchulus and Iotonchus has also been provided.

MATERIAL AND METHODS

Soil sampling: Soil samples were collected from around the roots of plants, from a depth of about 15-20 cms. Usually many sub-samples were taken and mixed to make a bulk sample. These samples were kept in polythene bags and brought to the laboratory for further processing.

Processing of soil samples: The samples were processed by sieving and decantation techniques. About 500 gms of soil was taken in a bucket filled to about two-thirds of its volume by water. The water was then stirred gently to make a homogeneous mixture. It was left undisturbed for about 10-20 seconds so that the heavy soil particles etc. may settle at the bottom, while the nematodes along with fine soil particles and debris remain suspended in the water. The entire suspension was first passed through a coarse sieve which separates roots, leaves and large soil particles. The comparatively homogeneous suspension obtained as above was then passed through a sieve of mesh No. 300 (pore size 53 um). The whole process was repeated twice or thrice to obtain maximum recovery of nematodes. The nematodes along with some debris remained on the sieve while fine soil particles passed through water. The entire catch on the sieve was taken into a beaker.

Isolation: The catch obtained was poured on a nylon filter or tissue filter paper, placed on a small coarse sieve. The latter was then kept in a modified Baermann's funnel filled with water

touching the bottom of the coarse sieve. This was kept undisturbed for about 24 hours. During this period the nematodes passed through the tissue paper and the coarse sieve into the clean water and settled at the bottom of the funnel. A small amount of water containing nematodes was taken in a test tube or cavity block, through the rubber tubing attached to the bottom of the funnel. The residue on the tissue paper was also checked under stereoscopic binocular microscope for inactive forms.

Killing and fixing: After the concentration of nematodes in the test tube or cavity block, the extra amount of water was removed with the help of a fine dropper. The nematodes were killed by pouring hot (60-70°C) 4% formalin and were stored in the same solution.

Mounting and Sealing: Temporary mounts, whenever needed, were made in water of fixative. For permanent mounts, the nematodes were transferred to a cavity block containing glycerine-alcohol (5 part glycerine + 95 parts 30% alcohol). The cavity block was then kept into a desiccator at room temperature for slow dehydration. Within two to three weeks the alcohol evaporates leaving nematodes in pure glycerine completely dehydrated and ready for permanent mounting.

The metallic or glass slides were used for permanent mounts. For this, the nematodes were transferred to a drop of

dehydrated glycerine and pieces of glass-wool of suitable thickness were placed and it was then gently covered with a round coverslip. Extra amount of glycerine, if any, was removed with a blotting paper. The slides were sealed either with nail-polish or glycael.

Measurements and drawings: All the measurements were taken with the help of an ocular micrometer, using De Man's (1884) formula for denoting the dimensions. Drawings were made with the help of a camera lucida.

In the text um stands for µm.

GENUS MYLONCHULUS (COBB, 1916) ALTHERR, 1953

Cobb (1916) proposed Mylonchulus as a subgenus under Mononchus and Altherr (1953) raised it to generic rank. Andrassy (1956) gave a list of the valid species under the genus Mylonchulus. Clark (1961) described two new species of Mylonchulus from New Zealand. Mulvey (1961) described three new and several known species, males of some species were reported and also a key to the species was given. Coetzee(1967a) described two new and several known species of Mylonchulus from South Africa. Mulvey and Jensen (1967) described six known and a new species of Mylonchulus from Nigeria. Jensen and Mulvey (1968) published a monograph on the Mononchidae of Oregon in which they described three new and eight known species of Mylonchulus.

In India, Kannan (1961) for the first time described a new species of Mylonchulus (M. madrasi) from Madras, but this species is now regarded as species inquirenda because of its inadequate description. Jairajpuri (1970a) gave a detailed account of morphology of Mylonchulus, described five known and five new species from India and also gave a key to the species of Mylonchulus. He also proposed M. californicus a new species for the Californian population of M. index described by Mulvey (1961).

Systematic position:

Order	:	Mononchida
Suborder	:	Mononchina
Superfamily	:	Mononchoidea
Family	:	Mylonchulidae
Subfamily	:	Mylonchulinae

Diagnosis: Mylonchulinae: Lip region set off by a depression, distinctly wider than adjoining body. Dorsal tooth large to massive, situated in anterior half or anterior third of buccal cavity, three to several transverse rows of denticles forming a rasp-like area on the subventral walls. Two small submedian teeth may be present posterior to denticles on the vertical subventral wall. Female reproductive system amphidelphic or monoprodelphic. Males rare. Tail short but variable in shape, conoid to hemispheroid. Caudal glands usually well developed, either grouped or tandem, sometimes absent. Spinneret terminal, subterminal or absent.

Type species : Mylonchulus minor (Cobb, 1913) Andrassy, 1958.

MORPHOLOGICAL NOTES ON *MYLONCHULUS*

Members of the genus *Mylonchulus* are cosmopolitan. They are small in size ranging from 0.5-2.0 mm. Upon fixation they are ventrally curved, often C-shaped. Anterior half of body is slightly curved, but the posterior half shows pronounced ventral curvature.

Cuticle: The cuticle is smooth, (except in *M. californicus* in which the inner cuticle has transverse markings). Thickness of cuticle varies from 2-5 um at different places on the body, usually thicker near vulva, anus and on tail. The body pores are faint, lateral chords 1/4th-1/2 body-width wide near middle, easily visible.

Lip region: The lip region is clearly marked off from the body by a depression, distinctly wider than adjoining body. The width of the lip region is nearly 2-3 times of its height or nearly equal to the length of the buccal cavity. There are six lips which may either be conoid or rounded. Labial papillae are well developed.

Amphids: Amphids are small goblet or cup-shaped; amphidial apertures are 2-5 um wide, post-labial. The position may be variable, either at the level, or slightly anterior, or posterior to the apex of dorsal tooth. The position of amphids is gnerally constant within a species.

Buccal cavity: The buccal cavity is strongly sclerotized, barrel-shaped, tapering at base, about 2-3 times as long as wide. The walls of the buccal cavity are formed by two sets of plates. The anterior set is vertical and more prominent, followed by an oblique set of basal plates. Each of these sets is tripartite with one dorsal and two subventral walls. The dorsal wall of the anterior set bears a massive dorsal tooth, anteriorly directed, situated at 69-92% of the length of buccal cavity from base. The subventral walls of vertical set bear three to numerous transverse rows of denticles forming a rasp-like area. The anterior most row of denticles is always prominant and regularly arranged, posterior ones are smaller in size and irregularly arranged. Behind denticles, a pair of submedian teeth may be present. At the base of the buccal cavity a pair of foramina are always present on the oblique subventral walls. The size and shape of buccal cavity, the position of dorsal tooth, the number of transverse rows of denticles, and the presence or absence of submedian teeth are generally constant within a species. The number of transverse rows of denticles sometimes varies (i.e., 6-7 in M. hawaiiensis and M. brachyuris).

Oesophagus: It is a cylindroid, strongly muscular and straight tube-like structure. The anterior portion of oesophagus is slightly expanded to encircle the base of buccal cavity. It occupies 25-35% of the body length. The oesophageal glands and its nuclei are not clearly visible, but their orifices may be

seen. The orifice of dorsal gland opens near middle of oesophagus. The second pair opens at base of oesophagus and the first pair opens between the two.

The nerve ring encircles the oesophagus nearly at 1/3rd of the oesophageal length. Excretory pore is not visible. Oesophago-intestinal junction is non-tuberculate type, with small usually conoid cardia attached at its base. Intestine is a straight tube made up of single layer of polygonal (mostly hexagonal) granular cells. The granulation frequently gives the intestine a tessellated appearance. Rectum nearly one anal body-width long, opens externally through a ventrally situated anus. Rectal glands are visible in males but not in females.

Female reproductive system: The female reproductive system is telogonic, i.e., the growth occurs from a single cap cell. It mainly comprises of vulva, vagina, uterus, oviduct and ovary. The vulva is transverse, slit-like, generally located in the posterior half of body. Pre- and post-vulval papillae are present in some species (*M. sigmaturellus*, *M. bulbiferus*, *M. exacutus*, *M. orbitus* and *M. dentatus*). The number of vulval papillae may be variable within a particular species. Vagina short thick-walled, cuticularised pieces are present at vulva-vagina junction.

The female genital tract is amphidelphic or mono-prodelphic, ovaries are reflexed and made up of germinal and

growth zones. The growth zone is followed by an oviduct, which has a narrow distal and an enlarged glandular proximal part. The uterus is a wide tube and may function as sperm storage organ. Sphincter is present at oviduct-uterus junction (M. californicus and M. orbitus), weakly developed (M. dentatus), usually absent (M. hawaiiensis, M. mulveyi). In mono-prodelphic species a post-uterine sac may be present (M. californicus).

Male reproductive system: Males are very rare and the reproductive system comprises of a pair of testes, vas deferens, ejaculatory duct, a pair of identical spicules, a gubernaculum, lateral accessory pieces and ventromedian supplements.

The male gonad is telongonic and diorchic. Each testis has a germinal and growth zone. The growth zone is followed by a pair of short seminal vesicle which are dilated portions of the male gonoduct and function as sperm storage organ. The seminal vesicle form a single vas deferens the lumen of which narrows and ultimately joins the rectum to form the cloaca. The shape and size of spicules, gubernaculum, lateral accessory pieces, and the number of ventromedian supplements vary from species to species. Lateral accessory pieces are absent in few species.

Tail: The tail is an important diagnostic character. The shape and size of tail are usually constant within a particular species with some variations. The length of tail varies from 1-3 anal body widths. Some species have hemispheroid to obtusely rounded

tails (M. rotundicaudatus, M. bulbiferus, M. striatus, M. solus, M. orbitus and M. muradi), arcuate conoid to slightly subclevate (M. lacustris, M. minor and M. hawaiiensis), conoid to elongate-conoid (M. subsimilis, M. brachyuris, M. contractus and M. exacutus) and digitate to subdigitate (M. index, M. sigmaturus and M. sigmaturellus). Caudal pores are generally obscure.

Caudal glands: Three unicellular glands are usually present in the anterior part of tail. Caudal glands are usually well developed, may be poorly developed (M. striatus, M. exacutus and M. rotundicaudatus) or absent (M. solus and M. simlaensis n.sp.). They are either grouped or tandem in their arrangement, connected to a duct which opens to the exterior by a cuticularized opening called spinneret. The spinneret is either terminal (M. mulveyi, M. hawaiiensis, M. muradi and M. sigmaturus) or subterminal dorsally (M. brachyuris, M. contractus and M. nainitalensis) or subterminal ventrally (M. rotundicaudatus and M. ventralis n.sp.). The arrangement of caudal glands is variable in some species but the position of sphinneret is always constant.

DESCRIPTIONS OF SPECIES

MYLONCHULUS MULVEYI JAIRAJPURI, 1970

(Fig. 1, G-J & 6, A-B)

Dimensions: Table I.

Descriptions:

Female: Body ventrally arcuate, often C-shaped upon fixation, tapering towards both the extremities. Cuticle smooth 2-3 um thick. Lateral chords 1/4th-1/3rd body-width wide near middle. Lip region marked off, wider than adjoining body. Amphids small, goblet shaped, apertures slit-like, situated at level of or slightly posterior to apex of dorsal tooth. Buccal cavity comparatively narrow, barrel shaped, dorsal tooth apex situated in the anterior-third of buccal cavity. Transverse rows of denticles four, the inner two rows faint. Submedian teeth absent, but a faint muscle band is present below the transverse rows of denticles. Orifices of oesophageal glands located as follows: dorsal 135-176 um from anterior end of body; the first pair of subventrals 35-45 um from the dorsal one; the second pair of subventrals 65-80 um from the first pair. Intestine sac-like. Rectum less than one anal body-width long. Vulva transverse, vagina short, thick-walled. Cuticularized pieces present, at vulva-vagina junction. Reproductive system mono-prodelphic, ovary reflexed consisting of 10-15 oocytes. Oviduct with narrow distal and swollen proximal part, uterus sac-like. No sphincter at oviduct-uterus junction. Post-uterine sac absent. Tail elongate conoid, sharply tapering, slightly arcuate then straight,

about 2 anal body-width long. Caudal glands grouped, spinneret terminal.

Male: Spicules long, slender; gubernaculum crescent-shaped, about 1/3rd of the spicule length. Lateral accessory pieces present. Supplements 8.

Localities: Table I.

Remarks: It is a very widely distributed species in this country, and has also been reported from some other regions of the world (cf. Bagri & Jairajpuri, 1973). This species shows considerable variations in the position of dorsal tooth, position of vulva and in the shape and size of tail. The male of this species has been recorded for the first time.

MYLONCHULUS BRACHYURIS (BUTSCHLI, 1873) ANDRASSY, 1958

(Fig. 2, A–F)

Dimensions: Table II

Descriptions:

Female: Body ventrally curved upon fixation, tapering gradually at both ends. Cuticle smooth, 2–4 um thick at different places on body. Lateral chords about 1/3rd body-width wide near middle. Lip region distinctly wider than adjoining body. Amphids small cup-shaped, amphidial aperture

located at the level, or slightly anterior or posterior to apex of dorsal tooth. Buccal cavity barrel-shaped, dorsal tooth massive. Transverse rows of denticles 6-7. Submedian teeth and refractive band of muscles present. The orifices of oesophageal glands located as follows: dorsal 154-166 um from anterior end of body, the first pair of subventrals 45-53 um from the dorsal one, the second pair 74-99 um from the first pair. Intestine sac-like. Rectum less than one anal body-width long. Vulva transverse, vagina thick-walled. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary with 6-9 oocytes, an oviduct with proximal glandular and a narrow distal part and uterus. No sphincter at oviduct-uterus junction. Tail ventrally arcuate gradually tapering towards tip. Caudal glands grouped. Spinneret subterminal.

Male: Spicules long slender. Lateral accessory pieces absent. Gubernaculum trough-shaped about 1/3rd spicule length. Supplements 12.

Localities: Table II

Remarks: It is a cosmopolitan species. The present specimens, collected from different localities in India, fit the descriptions of M. brachyuris as given by Mulvey (1961) and Jairajpuri (1970). The males are being recorded for the first time from India. De Man (1876) has described the male having

two bifurcated accessory pieces and spicules measuring approximately 65 um in length. Goodey (1942) has also illustrated bifurcated accessory pieces in the male of M. brachyuris. Mulvey (1961) considered both the described males to be of M. sigmaturus. He did not find any bifurcated accessory piece in the males from Canada and Holland. In the present males also bifurcated accessory pieces are not present and they fit the description as given by Mulvey (1961).

MYLONCHULUS HAWAIIENSIS (CASSIDY, 1931) ANDRASSY, 1958 (Fig. 1, A-C).

Dimensions:

Dehra Dun population:

Females (2): L = 0.92-0.99 mm; a = 27-30; b = 2.6-3.1; c = 33-39; V = $^{9-11}_{63-65}$ $^{7-11}$.

Rishikesh population:

Females (5): L = 1.13-1.23 mm; a = 23-26; b = 2.9-3.2; c = 32-44; V = $^{7-15}_{58-65}$ $^{7-12}$.

Srinagar population:

Females (3): L = 0.81-0.94 mm; a = 23-24; b = 3.1-3.3; c = 28-30; V = $^{11-14}_{61-63}$ $^{12-13}$.

Thaobal population:

Females (6): L = 0.81-1.06 mm; a = 21-27; b = 2.6-3.3; c = 26-34; V = $^{7-17}59-65^{11-16}$.

Description:

Body ventrally arcuate upon fixation, tapering towards both extremities. Cuticle smooth, 2-4 um thick at different places on body. Lateral chords prominent about 1/3rd body-width wide near middle. Lip region set off, 17-26 um wide, 4-6 um high, distinctly wider than adjoining body. Amphids cup-shaped with slit-like apertures, 3-4 um wide, located at 13-16 um from base of buccal cavity. Buccal cavity 17-26 um x 9-16 um. Apex of dorsal tooth at 14-21 um or 73-83% of the length of buccal cavity from base. Transverse rows of denticles 6-7. Submedian teeth well developed, refractive band of muscle present. Nerve ring at 74-115 um from anterior end of body. Orifices of oesophageal glands located as follows: dorsal 151-196 um from anterior end of body, the first pair of subventrals 30-59 um from the dorsal one, the second pair 45-109 um from the first pair. Intestine sac-like. Rectum 14-22 um or about one anal body-width long. Vulva transverse, vagina thick-walled. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary, an oviduct and uterus, and without a sphincter at oviduct-uterus junction. Tail 25-36 um long, conoid, ventrally curved or sharply curved near middle. Caudal glands

tandem or grouped. Sphincter terminal.

Male: Not found.

Localities:

i) Rajpur, Dehra Dun, Uttar Pradesh.

ii) Rishikesh, Saharanpur, Uttar Pradesh

iii) Srinagar, Jammu & Kashmir

iv) Thaobal, Manipur.

Remarks: Mulvey (1961) considered M. hawaiiensis to be a synonym of M. incurvus (Cobb 1917) Andrassy, 1958, but Mulvey & Jensen (1967) revalidated it. Jairajpuri (1970) recorded it for the first time from India. This species shows considerable variations in the size of buccal cavity, position of amphidial apertures, and dorsal tooth and in the shape of tail.

MYLONCHULUS CONTRACTUS JAIRAJPURI, 1970

(Fig. 1, D-F).

Dimensions:

Dehra Dun population I:

Females (4): L = 0.92-1.08 mm; a = 28-35; b = 3.0-3.2; c = 35-38; V = $^{6-11}_{60-61}{}^{6-10}$.

Dehra Dun population II:

Females (4): L = 0.89-1.11 mm; a = 29-39; b = 2.7-3.3; c = 32-40; V = $^{6-9}_{58-65}{}^{7-8}$.

Haldwani population:

Females (4): L = 0.92-1.06 mm; a = 26-31; b = 3.0-3.2; c = 37-43; V = $^{6-9}56-61^{6-9}$.

Haridwar population:

Females (2): L = 0.61-0.65 mm; a = 22; b = 2.6-2.7; c = 30-31; V = $^{11}53^{6-9}$.

Description:

Body ventrally curved upon fixation, tapering towards both the extremities. Cuticle smooth 1-3 um thick at different places on body. Lateral chords 1/3rd body-width wide near middle. Lip region 16-21 um wide, 4-6 um high, distinctly wider than adjoining body. Amphids small cup-shaped, amphidial apertures 2-4 um wide, located at about 12-16 um from base of buccal cavity. Buccal cavity 15-22 um x 9-14 um. Apex of dorsal tooth at 12-17 um or 73-86% of the length of buccal cavity from base. Transverse rows of denticles 5. Submedian teeth small and refractive band of muscles present. Nerve ring at 70-93 um from anterior end of body. Orifices of oesophageal glands located as follows: dorsal 120-145 um from anterior end of body; the first pair of subventrals 25-30 um from the dorsal one; the second pair 52-63 um from first pair. Intestine sac-like, contracted dorsally in the region of gonads. Rectum 12-17 um or less than one anal body-width long. Vulva transverse, vagina thick-walled, small oval cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, small and compact. Each sexual branch consists of

a reflexed ovary with 6-8 oocytes. Proximal part of oviduct swollen, provided with large number of glandular cells followed by a narrow part. Uterus small. No sphincter at oviduct-uterus junction. Tail 21-36 um, conoid with blunt terminus. Caudal glands grouped, spinneret subterminal.

Male: Not found .

Localities:

i) Dehra Dun, Uttar Pradesh.

ii) Clamen Town, Dehra Dun, Uttar Pradesh.

iii) Haldwani, Nainital, Uttar Pradesh.

iv) Haridwar , Saharanpur, Utter Pradesh.

Remarks: Mylonchulus contractus Jairajpuri, 1970 shows considerable variations in the shape and size of tail. The usual arrangement of caudal glands is that they are grouped, but in a few specimens the arrangement is tandem.

MYLONCHULUS DENTATUS JAIRAJPURI, 1970

(Fig. 4, A-C)

Dimensions:

Ahmedabad population:

Females (2): L = 1.63-1.78 mm; a = 32-37; b = 3.5-4.2; c = 30-33; V = $^{15}62-71^{11-15}$.

Pantnagar population:

Females (6): L = 1.27-1.39 mm; a = 26-33; b = 2.9-3.1; c = 32-34; V = $^{11-23}_{66-67}{}^{11-16}$.

Description:

Body strongly arcuate ventrally upon fixation, tapering towards extremities. Cuticle smooth, 3-4 um thick at different places on body. Lateral chords 1/3rd body-width wide near middle. Lip region 24-29 um wide, 5-6 um high, distinctly wider than adjoining body. Amphids small, cup-shaped, apertures 4-5 um wide, located at 20-24 um from base of buccal cavity. Buccal cavity 26-29 um x 16-19 um. Apex of dorsal tooth at 22-25 um or 76-85% the length of buccal cavity from base. Subventral wall bear numerous denticles, not arranged in definite rows. Submedian teeth prominent, refractive band of muscles present. Nerve ring at 103-119 um from anterior end of body. Orifices of oesophageal glands located as follows: dorsal 220-248 um from anterior end of body, the first pair of subventrals 57-70 um from the dorsal one, the second pair at 105-131 um from first pair. Intestine sac-like. Rectum 17-25 um, less than one anal body-width long. Vulva transverse, vulval papillae present, pre-vulval 0-3, post-vulval 0-2. Vagina thick-walled, small cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary with 10-14 oocytes. Oviduct with proximal swollen glandular part and a narrow distal part. A weakly

developed sphincter is present at oviduct-uterus junction. Tail 36-54 um, conoid, sharply bent near anus and then tapering towards tip. Caudal glands grouped. Spinneret terminal.

Male: Not found.

Localities:

i) Aslali, Ahmedabad, Gujrat.

ii) Pantnagar, Nainital, Uttar Pradesh.

MYLONCHULUS SIGMATURUS (COBB, 1917) ALTHERR, 1953

(Fig. 3, A-C).

Dimensions:

Mussoorie population:

Female : L = 1.25 mm; a = 31; b = 2.9; c = 46; V = $^{14}_{67}{}^{10}$.

Kangabok population I :

Females (4) : L = 1.00-1.17 mm; a = 27-30; b = 2.9-3.5; c = 40-42; V = $^{12-14}_{66-70}{}^{12-17}$.

Kangabok population II:

Females (3) : L = 0.98-1.14 mm; a = 27-30; b = 2.6-3.5; c = 37-42; V = $^{13-14}_{62-66}{}^{11-14}$.

Description:

Body ventrally curved upon fixation, tapering towards extremities. Cuticle smooth, 2-3 um thick at different places

on body. Lateral chords about 1/3rd body-width wide near middle. Lip region 21-24 um wide, 4-5 um high, distinctly wider than adjoining body. Amphids small, cap-shaped, apertures 3-4 um wide, located at 10-20 um from base of buccal cavity. Buccal cavity 24-26 um x 14-16 um. Apex of dorsal tooth at 19-21 or 75-81% of the length of buccal cavity from base. Transverse rows of denticles six. Submedian teeth and refractive band of muscles present. Nerve ring located at 95-106 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 170-190 um from anterior end of body, the first pair of subventrals 40-55 um from the dorsal one, the second pair 90-102 um from the first pair. Intestine sac-like. Rectum 16-20 um or less than one anal body-width long. Vulva transverse, cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consists of a reflexed ovary with 12-16 oocytes, oviduct and uterus. No sphincter at oviduct-uterus junction. Tail 24-26 um, conoid, ventrally curved with clavate terminus. Caudal glands grouped. Spinneret terminal.

Male: Not found.

Localities:

i) Mussoorie, Uttar Pradesh

ii & iii) Kangabok, Manipur.

MYLONCHULUS LACUSTRIS (N.A.COBB IN M.V.COBB, 1915) ANDRASSY, 1958 (Fig. 3, G - I).

Dimensions:

Gauhati population:

Females (2) : L = 1.29-1.45 mm; a = 25-34; b = 3.7-3.9; c = 33-37; V = $^{12-17}_{65-69}{}^{12-23}$.

Silibhit population:

Females (2) : L = 1.37-1.41 mm; a = 27-28; b = 3.6-3.7; c = 26-32; V = $^{11-13}_{67-68}{}^{9-10}$.

Description :

Body slightly to strongly ventrally arcuate upon fixation, tapering towards extremities. Cuticle smooth, 3-4 um thick at different places on the body. Lateral chords 1/3rd body-width wide near middle. Lip region 26-29 um wide, 6-8 um high, distinctly wider than adjoining body. Amphidial apertures 4-5 um wide, located anterior to dorsal tooth at 24-26 um from base of buccal cavity. Buccal cavity 32-34 um x 19-21 um. Apex of dorsal tooth 24-25 um or 75-79% of the length of buccal cavity from base. Transverse rows of denticles 7. Submedian teeth well developed, refractive band of muscles present. Nerve ring at 109-116 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 164-220 um from anterior end of body; the first pair of subventrals 40-70 um from the dorsal one; the second pair 96-105 um from the first

pair. Intestine sac-like. Rectum 17-21 um or less than one anal body-width long. Vulva transverse. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary, an oviduct and uterus. No sphincter at oviduct-uterus junction. Tail 39-49 um long, conoid arcuate. Caudal glands in tandem. Spinneret terminal well developed.

Male: Not found.

Localities:

i) Gauhati, Assam.

ii) Pilibhit, Uttar Pradesh.

MYLONCHULUS MURADI JAIRAJPURI, 1970

(Fig. 3, D-F).

Dimensions:

Female : L = 0.90 mm; a = 19; b = 2.8; c = 43; V = $^{11}66^{11}$.

Description:

Body ventrally curved upon fixation, tapering slightly towards extremities. Cuticle smooth, 3-4 um thick at different places on body. Lateral chords 1/3rd body-width wide near middle. Lip region 26 um wide, 6 um high, distinctly wider than adjoining body. Amphidial apertures 3 um wide, located at about

21 um from base of buccal cavity. Buccal cavity 26 um x 15 um. Apex of dorsal tooth at 20 um or 77% of length of buccal cavity from base. Transverse rows of denticles 7. Submedian teeth and refractive band of muscles present. Nerve ring located at 100 um from anterior end of body. Intestine sac-like. Rectum 17 um, less than one anal body-width long. Vulva transverse. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual brahnch consisting of a reflexed ovary, an oviduct and uterus. No sphincter at oviduct-uterus junction. Tail 21 um, obtusely rounded. Caudal glands grouped. Spinneret terminal.

Male: Not found.

Locality: Haldwani, Nainital, Uttar Pradesh.

MYLONCHULUS INDEX (COBB, 1906) ANDRASSY, 1958

(Fig. 2, G-H).

Dimensions:

Female : L = 0.68 mm; a = 28; b = 2.9; c = 32; V = 73.

Description:

Body ventrally arcuate upon fixation, tapering towards extremities. Cuticle smooth, 2-3 um thick, at different places on body. Lateral chords about 1/3rd body-width wide near middle.

Lip region 16 um wide, 5 um high, slightly wider than adjoining body. Buccal cavity 19 um x 10 um. Apex of dorsal tooth at 15 um from base of buccal cavity. Transverse rows of denticles 6. Submedian teeth absent, refractive band of muscles present. Nerve ring at 106 um from anterior end of body. Rectum 15 um, less than one anal body-width long. Reproductive system monoprodelphic, ovary reflexed. Post-vulval uterine sac absent. Tail 27 um long, hemispheroid having a ventral finger-like projection. Caudal glands grouped, spinneret terminal.

Male: Not found.

Locality: Imphal, Manipur.

MYLONCHULUS SIMLAENSIS N. Sp.

(Fig. 5, A-C).

Dimensions:

Holotype female : L = 0.76 mm; a = 20; b = 2.8; c = 51; V = $^{11}6\,3^{11}$.

Description:

Body ventrally arcuate upon fixation. Cuticle smooth, 2-3 um thick at different places on body. Lateral chords 1/3rd body-width wide near middle. Lip region 23 um wide, 5 um high, distinctly wider than adjoining body. Amphids cup-shaped,

apertures 4 um wide, located at 17 um from base of buccal cavity. Buccal cavity 23 um long, 15 um wide. Apex of dorsal tooth at 16 um or 79% of the length of buccal cavity from base. Transverse rows of dent clas 5. Submedian teeth small, refractive band of muscles poorly developed. Nerve ring at 76 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 196 um from anterior end of body; the first pair of subventrals at 35 um from the dorsal one; the second pair at 75 um from the first pair. Intestine sac-like. Rectum 14 um, less than one anal body-width long. Vulva transverse, vagina thick-walled. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary, an oviduct and uterus. No sphincter at oviduct-uterus junction. Tail 15 um, short bluntly rounded. Caudal glands and spinneret absent.

Male: Not found.

Type locality: Simla, Himachal Pradesh.

Type specimen: Collected in April 1976. Holotype on slide H.P-7/*Mylonchulus simlaensis* n. sp.

Differential diagnosis: *Mylonchulus simlaensis* n. sp. comes close to *M. striatus* (Thorne, 1924) Andrassy, 1958 and *M. solus* Mulvey, 1961. From the former it differs in the number of transverse rows of denticles and in the absence of caudal glands and spinneret (transverse rows of denticles 6, caudal glands and

spinneret present although poorly developed in M. striatus). From M. solus it differs in the size of body and the buccal cavity and in the shape and length of tail (L = 1.40 mm; buccal cavity 34 x 18 um and tail 40 um in M. solus).

MYLONCHULUS VENTRALIS N. SP.

(Fig. 5, D - F).

Dimension:

Holotype female : L = 0.96 mm; a = 24; b = 2.9; c = 46; V = $^{12}64^{9}$.

Description:

Body ventrally arcuate upon fixation, tapering towards extremities. Cuticle smooth, 2-3 um thick at different places on body. Lateral chords 1/3rd body-width wide near middle. Lip regionset off, 25 um wide, 6 um high, distinctly wider than adjoining body. Amphids cup-shaped, apertures 4 um wide, located at 20 um from base of buccal cavity. Buccal cavity 26 um x 15 um Apex of dorsal tooth at 21 um or 79% of the length of buccal cavity from base. Transverse rows of denticles 6. Submedian teeth and refractive band of muscles well developed. Orifices of oesophageal glands located as follows : dorsal 182 um from anterior end of body; the first pair of subventrals 39 um from dorsal one; the second pair 86 um from the first pair. Intestine

sac-like. Rectum 20 um, less than one anal body-width long. Vulva transverse. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary, an oviduct and uterus. No sphincter at oviduct-uterus junction. Tail short, 21 um long, slightly curved ventrally. Caudal glands grouped. Spinneret subterminal ventrally.

Male: Not found.

Type locality: Kangabok, Manipur.

Type specimens: Collected in December 1976. Holotype on slide MNP-54/Mylonchulus ventralis n. sp.

Differential diagnosis: Mylonchulus ventralis n. sp. comes closest to M. rotundicaudatus (Skwarra, 1921) Andrassy, 1958 but differs in having a smaller body, smaller buccal cavity, in the number of transverse rows of denticles, in having a shorter tail and in the presence of well developed caudal glands (L = 1.7 mm; buccal cavity = 35 x 22 um, tail = 50 um, transverse rows of denticles 7 and the caudal glands are obscure in M. rotundicaudatus).

KEY TO THE SPECIES OF *MYLONCHULUS*

(Modified after Khan & Jairajpuri, 1979)

1. Female reproductive system mono-prodelphic 2
   Female reproductive system amphidelphic 8

2. Caudal glands and spinneret absent 3
   Caudal glands and spinneret present 4

3. Post-vulval uterine sac present .....
   ..... *caespitosus* Mizzhivin, 1971
   Post-vulval uterine sac absent .....
   ..... *silvaticus* Mizzhivin, 1971

4. Spinneret subterminal .....
   ..... *subterraneus* (Schneider, 1940) Andrassy, 1958
   Spinneret terminal 5

5. Post-vulval uterine sac present .....
   ..... *californicus* Jairajpuri, 1970
   Post-vulval uterine sac absent 6

6. Tail digitate..... *index* (Cobb, 1906) Andrassy, 1958
   Tail elongate conoid 7

7. Buccal cavity 19-24 x 10-14 um; V = 74; tail sharply conoid, dorsal curvature small .....
   ..... *mashhoodi* Khan & Jairajpuri, 1979
   Buccal cavity 14-17 x 6-6 um; V = 75-82; tail elongate dorsal curvature flattened ..... *mulveyi* Jairajpuri, 1970

8. Caudal glands and spinneret obscure or absent 9
   Caudal glands and spinneret conspicuous 13

9. Tail bluntly rounded 10
   Tail conoid to cylindroid or conoid arcuate 11

10. Caudal glands and spinneret obscure, transverse rows of denticles 6 ..... striatus (Thorne, 1924) Andrassy, 1956
    Caudal glands and spinneret absent, transverse rows of denticles 5 ..... gimlaensis n. sp.

11. Tail conoid becoming cylindroid in posterior half by a gradual narrowing 12
    Tail conoid arcuate 13

12. Submedian teeth present ..... solus Mulvey, 1961
    Submedian teeth absent ... exacutus Jensen & Mulvey, 1966

13. Transverse rows of denticles 7; c = 20-29 .....
    ..... psammophilus Yeates, 1967
    Transverse rows of denticles 6; c = 30-49 .....
    ..... subsimilis (Cobb, 1917) Meyl, 1957

14. Spinneret subterminal 15
    Spinneret terminal 25

15. Spinneret subventrally subterminal 16
    Spinneret subdorsally subterminal 17

16. Caudal glands obscure, tail 50 um .....
    ..... rotundicaudatus (Skwarra, 1921) Andrassy, 1956

Caudal glands well developed, tail 21 um .....
..... ventralis n. sp.

17. Tail short (c = 61-69); clavate .....
.. .. bulbiferous Jensen & Mulvey, 1966
Tail long (c = 50 or less); conoid to bluntly conoid ....
.....18

18. Intestine characteristically narrowed in the gonad region
..... contractus Jairajpuri, 1970
Intestine normal with gonads overlapping 19

19. Submedian teeth absent ..... ubis Clark, 1961
Submedian teeth present 20

20. Body length avg. 1.4 mm or more 21
Body length avg. 1.2 mm or less 23

21. Tail longer, c = 25, about 2 anal body-widths long .....
..... parabrachyuris (Thorne, 1924) Andrassy, 1958
Tail short, c = 40-50; about one anal body-width long ...
..... 22

22. Buccal cavity long 30-36 x 16-20 um .....
..... brevicaudatus (Cobb, 1917) Altherr, 1954
Buccal cavity short 20 x 13 um .....
..... obliquus (Cobb, 1917) Andrassy, 1958

23. Caudal glands grouped .....
..... brachyuris (Butschli, 1873) Altherr, 1953
Caudal glands tandem 24

24. Tail short (c = 40-66), bluntly conoid .....
..... nainitalensis Jairajpuri, 1970
Tail long (c = 22-26), elongate-conoid .....
..... agriculturae Coetzee, 1967

25. Tail obtusely rounded to hemispheroid 26
Tail conoid, elongate-conoid, cylindroid or subdigitate..
..... 28

26. Body length 1.9 mm; buccal cavity 40 x 30 um .....
..... obtusicaudatus (Daday, 1899) Andrassy, 1958
Body length under 1.6 mm; buccal cavity under 30 x 16 um.
..... 27

27. Vulval papillae present .....
..... orbitus Jensen & Mulvey, 1968
Vulval papilla absent ..... muradi Jairajpuri, 1970

28. Transverse rows of denticles numerous, not arranged in definite rows 29
Transverse rows of denticles arranged in definite rows ..
.....30

29. Vulval papillae present; tail bent near anus .....
..... dentatus Jairajpuri, 1970
Vulval papillae absent; tail arcuate .....
.... apapillatus Khan & Jairajpuri, 1979

30. Tail sharply bent near middle or slightly posterior to level of anus 31

Tail arcuate, conoid or elongate cylindroid 35

31. Transverse denticles arranged in 9-11 rows .... kaszabi Andrassy, 1967

Transverse denticles arranged in 7 rows or less 32

32. Tail sharply bent near middle, dorsal curvature smooth or even ..... incurvus (Cobb, 1917) Andrassy, 1956

Tail sharply bent near middle or slightly posterior to level of anus, dorsal curvature flattened or uneven 33

33. Tail conoid, then strikingly cylindroid just posterior to level of anus .... cavensis (Schneider, 1940) Andrassy, 1956

Tail conoid, then strikingly cylindroid in posterior half or less 34

34. Cylindroid part of tail about 1/3rd of tail length; vulval papillae absent .... sigmaturus (Cobb, 1917) Altherr, 1953

Cylindroid part of tail about half of tail length or more; vulval papillae present ..... sigmaturellus Mulvey, 1961

35. Anterior lip of anus massive, overhanging; V = 72 .... subtenuis (Cobb, 1917) Altherr, 1956

Anterior lip of anus not massive, or overhanging; V = 70.. 36

36. Tail 2-3 anal body-widths long 37

Tail less than two anal body-widths long 38

37. Body length avg. 1.2 mm; transverse rows of denticles 5 or 6 .....minor (Cobb, 1893) Andrassy, 1958

Body length avg. 1.5 mm, transverse rows of denticles 7 .. .lacustris (N. A. Cobb in M. V. Cobb, 1915) Andrassy, 1958

38. Tail elongate-cylindroid to slightly clavate at terminus.. 39

Tail conoid narrowing towards terminus 40

39. Submedian teeth present .... hawaiiensis (Cassidy, 1931) Andrassy, 1958

Submedian teeth absent .... amurus Khan & Jairajpuri, 1979

40. Caudal glands tandem ..... cerais Coetzee, 1967

Caudal glands grouped 41

41. Body length 1.45-1.46 mm; buccal cavity almost parallel sided .....arenicolus Clark, 1961

Body length 1.0-1.2 mm; walls of buccal cavity prominently curved ..... curvicaudus Mulvey & Jensen, 1967

NOT INCLUDED IN THE KEY

M. reversus (Cobb, 1917) Andrassy, 1958: transferred to oligonchulus by Andrassy (1976).

M. insolitus Andrassy, 1968: only mature males known, mature females unknown.

M. prodenticulatus Mulvey, 1961 : only males known, female unknown.

M. montanus (Thorne, 1924) Andrassy, 1958 : Synonym of M. lacustris.

M. longus Altherr, 1972 : Synonym of M. incurvus.

M. macrosoma Altherr, 1976 : Synonym of M. incurvus.

M. clavicaudatus (Schuurman Stekhoven & Teunissen, 1938) Andrassy, 1958 transferred to Polyonchulus by Jairajpuri(1970).

Species inquirendae (because of inadequate description)

M. sexcristatus (Mersheevskaya, 1951) Mulvey, 1961

M. madrasi Kahhan, 1961

M. japonicus (Cobb, 1917) Andrassy, 1958

M. denticulatus (Cobb, 1917) Andrassy, 1958

M. micrurus (Cobb, 1917) Andrassy, 1958

M. polonicus (Stefanski, 1915) Andrassy, 1958

M. sparsus (Cobb, 1917) Andrassy, 1958

M. howeyi Altherr & Deboutteville, 1972

M. vulvapapillatus Altherr & Deboutteville, 1972.

GENUS IOTONCHUS (COBB, 1916) ALTHERR, 1950

Cobb (1916) erected Iotonchus as a subgenus of Mononchus Bastian, 1865 for large species of mononchs with a small basal tooth or teeth, an elongated, three-ribbed stoma, a long slender tail, and single or paired reflexed ovaries; he designated M. gymnolaimus Cobb as it type. Altherr (1950) first gave Iotonchus generic rank. Clark (1960) described four new and a known species of Iotonchus from New Zealand. Mulvey (1963) described several known and new species of Iotonchus and also gave a key to species. Buangsuwon & Jensen (1966) described five new and a known species of Iotonchus from Thailand. Mulvey & Jensen (1967) described five new and four known species of Iotonchus from Nigeria and provided a key to species. Jairajpuri (1969) for the first time described two new and a known species of Iotonchus from India and provided a key including all the species known till that time. The species of Iotonchus are of common occurrence throughout the world and some of them are also found in this country.

Systematic position:

Order	:	Mononchida
Suborder	:	Mononchina
Superfamily	:	Anatonchoidea
Family	:	Iotonchidae

Diagnosis: Iotonchidae: Dorsal tooth small to medium-sized, variable in position from base to anterior half of buccal cavity. Submedian teeth absent. Gonads amphidelphic or mono-prodelphic. Tail variable but similar in both sexes. Caudal glands and terminal opening present or absent.

Type species: Iotonchus gymnolaimus (Cobb, 1893) Andrassy, 1956

Other species: Iotonchus zschokkei (Menzel, 1913) Altherr, 1955

I. acutus (Cobb, 1917) Andrassy, 1958

I. brachylaimus (Cobb, 1917) Andrassy, 1956

I. consimilis (Cobb, 1917) Andrassy, 1956

I. trichurus (Cobb, 1917) Andrassy, 1956

I. amphigonicus (Thorne, 1924) Andrassy, 1956

I. simmensensis (Kreis, 1924) Andrassy, 1956

I. parazschokki (Allgen, 1929) Andrassy, 1958

I. riocoeiae (Carvalho, 1955) Andrassy, 1956

I. jairi (Lordello, 1958) Clark, 1960

I. maragnus Clark, 1960

I. ophiocercus Clark, 1960

I. percivali Clark, 1960

I. basidontus Clark, 1960

I. vorax (Cobb, 1917) Mulvey, 1963

I. tenuidentatus (Kreis, 1924) Mulvey, 1963

I. antidontus Mulvey, 1963

I. arenicola Altherr, 1963

I. vulvapapillatus Andrassy, 1964

I. geminus Heyns & Lagerwey, 1965

I. transkiensis Heyns & Largerwey, 1965

I. pauli Heyns & Lagerwey, 1965

I. ainoatomos Buangsuwon & Jensen, 1966.

I. bangkokensis Buangsuwon & Jensen, 1966

I. chantaburensis Buangsuwon & Jensen, 1966

I. rayongensis Guangsuwon & Jensen, 1966

I. thailandensis Buangsuwon & Jensen, 1966

I. acuticaudus Mulvey & Jensen, 1967

I. clarki Mulvey & Jensen, 1967

I. nigeriensis Mulvey & Jensen, 1967

I. parabasidontus Mulvey & Jensen, 1967

I. tarjani Mulvey & Jensen, 1967

I. rinae Coetzee, 1967

I. spinicaudatus Coetzee, 1967

I. ovatus Jensen & Mulvey, 1968

I. baqrii Jairajpuri, 1969

I. indicus Jairajpuri, 1969

I. monhystera (Cobb, 1917) Jairajpuri, 1970

I. microdontus Thong, 1970

I. laticupulatus Rizzhivin, 1971

I. magyar Andrassy, 1973

I. acuticaudatus Eroshenko, 1975

I. cobbi Eroshenko, 1975

I. paraamphicoronicus Eroshenko, 1975

I. monticola Eroshenko, 1975

I. coomansi Baqri et al.. 1979

I. longicaudatus Baqri et al., 1979

I. shafii Khan & Jairajpuri (in press)

SOME MORPHOLOGICAL NOTES ON *IOTONCHUS*

Members of this genus are widely distributed. When killed in hot fixative, they assume a ventrally arcuate posture. Usually the anterior half of the body is slightly curved, while the posterior half is strongly ventrally curved. Cuticle is thick and smooth. The thickness varies on different parts of body. Body pores may or may not be visible. Lateral chords prominent 1/5th to 1/2 body-width wide near middle. Lip region marked off, 3-4 times as long as wide, distinctly wider than adjoining body. Buccal cavity large and wide, broad at the base. The dorsal wall bears a tooth of varying size, shape and position, situated either in the middle of buccal cavity (*I. jairi* & *I. monhystera*) or at the base (*I. indicus*, *I. parabasidontus*, *I. trichurus* & *I. clarki*). The subventral walls are not provided with ridges or teeth on denticles. Oesophgo-intestinal junction is tuberculate type.

The shape and size of tail varies from species to species. It may be short conoid (*I. jairi*) to long filiform, whip-like (*I. trichurus*). Three unicellular caudal glands are present in the anterior region of tail, but these are absent in *I. jairi*, *I. nigeriensis* and *I. clarki*. The caudal glands opening is either terminal (*I. parabasidontus*, *I. vulvapapillatus*) or subterminal ventrally (*I. indicus* and *I. tenuidentus*) or subterminal dorsally (*I. acuticaudatus*). The caudal glands may be present but without an opening (*I. tarjani*).

DESCRIPTIONS OF SPECIES

IOTONCHUS INDICUS JAIRAJPURI, 1969

(Fig. 7, D - F).

Dimensions:

Rishikesh population:

Females (7) : L = 1.59-2.11 mm; a = 26-35; b = 4.0-5.3; c = 5-6; V = $^{12-19}_{52-60}{}^{10-19}$.

Birganj population:

Females (3) : L = 1.48-1.66 mm; a = 26-27; b = 4.0-4.2; c = 5; V = $^{13-15}_{57-59}{}^{13-16}$.

Imphal population I:

Females (3) : L = 1.63-1.84 mm; a = 30-31; b = 4.1-4.4; c=5-6; V = $^{13-14}_{57-59}{}^{12-14}$.

Imphal population II:

Females (2) : L = 1.83-1.89 mm; a = 31-34; b = 4.3-4.6; c = 6; V = $^{7-9}_{55-59}{}^{6-9}$.

Description :

Body ventrally arcuate upon fixation, tapering markedly towards posterior end. Cuticle smooth, 4-6 um thick at different places on body. Lateral chords 1/4th body/width wide near middle. Lip region set off, 36-43 um wide, 10-13 um high, distinctly wider than adjoining body. Amphids small, cup-shaped, apertures 5-6 um wide, located at 32-35 um from base of buccal cavity. Buccal cavity 40-46 um x 28-30 um. Apex of dorsal tooth at

10-12 um or 22-27% of the length of buccal cavity from base. Nerve ring at 124-150 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 208-225 um from anterior end of body; the first pair of subventrals 73-96 um from the dorsal one; the second pair 64-100 um from the first pair. Oesophago-intestinal junction tuberculate. Rectum 19-25 um or less than one anal body width long. Vulva transverse, vagina thick-walled. Cuticularized pieces present at vulva-vagina junction. Reproductive system amphidelphic, each sexual branch consisting of a reflexed ovary with 10-13 oocytes, an oviduct and uterus. A faint sphincter may be present at oviduct-uterus junction. Tail 260-409 um or about 6-10 anal body-widths long, elongate-conoid, tapering gradually, tail tip sharply conoid. Caudal glands poorly developed, opening subterminal.

Male: Not found.

Localities:

i) Rishikesh, Saharanpur, Uttar Pradesh.

ii) Amlekhganj, Birganj, Nepal.

iii) Ngariyan hills, Imphal, Manipur

iv) Ngariyan hills, Imphal, Manipur.

Remarks: The present specimens of *I. indicus* collected from different localities are similar to one another and also fit the description of the species as given by Jairajpuri (1969). The only difference being the presence of a sphincter at oviduct-uterus junction in the present specimens and its absence in the specimens studied by Jairajpuri.

IOTONCHUS PARABASIDONTUS MULVEY AND JENSEN, 1967

(Fig.8, A - F).

Dimensions:

Simla population:

Females (2): L = 2.34-2.76 mm; a = 33-36; b = 4.1-4.4; c = 6-10; V = $^{13-16}_{63-64}{}^{11-15}$.

Male (1): L = 2.05 mm; a = 36; b = 5.2; c = 9; T = 40.

Thaobal population I :

Females (3): L = 2.05-2.56 mm; a = 24-33; b = 4.2-4.5; c = 7-9; V = $^{21-23}_{61-64}{}^{22-23}$.

Males (4) : L = 2.06-2.34 mm; a = 30-35; b = 3.9-4.4; c = 9-10; T = 52-63.

Thaobal population II :

Females (3): L = 1.85-2.43mm; a = 27-34; b = 3.7-4.6; c = 6-7; V = $^{21-23}_{58-63}{}^{16-22}$.

Thaobal population III :

Females (2): L = 2.81-3.45 mm; a = 31-32; b = 4.4-5.0; c = 7-8; V = $^{18-20}_{60-61}{}^{14-20}$.

Kathmandu population:

Females (2): L = 2.34-2.92 mm; a = 32-36; b = 3.4-4.3; c = 6; V = $^{15-17}_{62-64}{}^{13-15}$.

Descriptions:

Female: Body ventrally curved upon fixation, tapering gradually towards posterior end. Cuticle smooth, 3-5 um thick at different places on body. Lateral chords 1/5-1/4th body-width wide near middle. Lip region set off, 45-53 um wide, 12-17 um high, distinctly wider than adjoining body. Amphidial apertures 6-7 um wide, located at 39-50 um from base of buccal cavity. Buccal cavity 49-59 um x 32-42 um. Apex of dorsal tooth at 12-17 um from base of buccal cavity. Oblique subventral walls bear two small foramina each. Nerve ring at 140-173 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 250-273 um from anterior end of body; the first pair of subventrals 95-113 um from dorsal one; the second pair at 129-146 um from the first pair. Oesophago-intestinal junction tuberculate. Rectum 21-26 um, less than one anal body-width long. Vulva transverse, vagina thick-walled. Cuticularized pieces at vulva-vagina junction well developed. Vulval papillae present, 1-3 prevulval, 1-2 post-vulval. Reproductive system amphidelphic, each sexual branch consists of a reflexed ovary, an oviduct with proximal glandular and distal narrow part and uterus. A prominent sphincter present at oviduct-uterus junction. Tail 225-416 um, elongate conoid. Caudal glands and terminal opening present.

Male: Body strongly curved in the post-anal region. Lip region 39-47 um wide, 11-12 um high. Amphidial apertures

6-7 um wide located at 39-43 um from base of buccal cavity. Buccal cavity 44-49 um x 26-29 um. Spicules 95-107 um long. Gubernaculum 28-30 um and lateral accessory pieces 18-21 um. Ventromedian supplements 12-15. Tail 212-229 um long, conoid, ventrally curved. Caudal glands and terminal opening present.

Localities:

(i) Simla, Himachal Pradesh.

(ii) - (iv) Thoubal, Manipur.

(v) Kathmandu, Nepal.

IOTONCHUS TRICHURUS (COBB, 1917) ANDRASSY, 1956

(Fig. 7, A-C).

Dimensions:

Saharanpur population:

Females (6): L = 1.36-1.74 mm; a = 34-40; b = 4.1-4.6; c = 3-4; V = $^{16-24}_{59-66}$.

Bareilly population:

Females (8): L = 1.36-1.60 mm; a = 33-36; b = 4.5-4.9; c = 3-4; V = $^{16-23}_{54-59}$.

Dehra Dun population:

Females (2): L = 1.40-1.47 mm; a = 31-33; b = 4.3; c = 3-4; V = $^{14-15}_{60-62}$.

Theobal population:

Females (4): L = 1.35-1.47 mm; a = 36-40; b = 4.1-4.3; c = 3-4; V = $^{13-20}56-61$.

Gauhati population:

Females (2): L = 1.44-1.56 mm; a = 34-39; b = 4.3; c = 4; V = $^{17-20}60$.

Description:

Body ventrally curved upon fixation, tapering sharply from vulva to tail tip. Cuticle smooth, 1-2 um thick at different places on body. Lateral chords, about 1/3-1/2 body-width wide near middle. Lip region set off, 22-27 um wide, 6-8 um high, distinctly wider than adjoining body. Amphidial apertures 3-4 um wide, located at 21-27 um from base of buccal cavity. Buccal cavity 26-35 um long; 15-21 um wide. Apex of dorsal tooth at 7-9 um from base of buccal cavity. Nerve ring at 89-112 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 156-209 um from anterior end of body; the first pair of subventrals 57-67 um from dorsal one; the second pair 70-82 um from the first pair. Oesophago-intestinal junction tuberculate. Rectum 14-18 um, or less than one anal body-width long. Cuticularised pieces present at vulva vagina junction. Reproductive system mono-prodelphic, ovary reflexed bearing 11-14 oocytes. Oviduct with narrow distal and sac-like proximal part. No sphincter at oviduct-uterus junction.

Tail 290-465 um long filiform. Caudal glands poorly developed, opening terminally.

Male: Not found.

Localities:

i) L. R. Brothers' Nursery, Saharanpur, Uttar Pradesh.

ii) Bareilly, Uttar Pradesh.

iii) Clamentown, Dehra Dun, Uttar Pradesh.

iv) Thaobal, Manipur.

v) Gauhati, Assam.

Remarks: This species is fairly well distributed in India. The present specimens that were collected from different localities resemble one another and also fit the description of the species as given by Cobb (1917).

IOTONCHUS JAIRI (LORDELLO, 1958) CLARK, 1960

(Fig. 9, A - C).

Dimensions:

Rishikesh population:

Female : L = 1.35 mm; a = 24; b = 3.5; c = 17; V = $^{18}_{79}$.

Gauhati population:

Females (3): L = 1.07-1.26 mm; a = 20-27; b = 3.4-3.7; c = 14-16; V = $^{21-28}_{71-78}$.

Gauhati population:

Females (2) : L = 1.61-1.66 mm; a = 21-22; b = 3.3-3.4; c = 16-17; V = $^{19-21}79$.

Description :

Body ventrally arcuate upon fixation, tapering towards extremities. Cuticle smooth, 2-4 um thick at different places on body. Lateral chords prominent, about 1/3rd body-width wide near middle. Lip region, set off, 33-35 um wide, 9-11 um high, distinctly wider than adjoining body. Amphids cup-shaped, apertures 3-4 um wide, located at 29-33 um from base of buccal cavity. Buccal cavity 35-40 um x 23-26 um. Dorsal tooth apex at 24-26 um or 61-66% of the length of buccal cavity from base. Nerve ring at 114-126 um from anterior end of body. Orifices of oesophageal glands located as follows : dorsal 173-198 um from anterior end of body; the first pair of subventrals 56-63 um from dorsal one; the second pair 69-81 um from first pair. Rectum 16-24 um or less than one anal body-width long. Vagina thick-walled with well developed muscle bands. Cuticularized pieces absent at vulva-vagina junction. Vulval papillae absent. Reproductive system mono-prodelphic, consisting of a reflexed ovary, an oviduct and uterus. No sphincter at oviduct-uterus junction. Tail 69-86 um long. Caudal glands obscure. Sphinneret absent.

Male: Not found.

Localities:

(i) Rishikesh, Saharanpur, Uttar Pradesh.

(ii) & (iii) Gauhati, Assam.

Remarks: The present specimens of *I. jairi* conform well with the description of species as given by Mulvey (1967) except for the presence of obscure caudal glands and well developed muscle bands around vagina.

OTHER MONONCHIDA RECORDED

S.No.	NEMATODE SPECIES	LOCALITY(IES)
1.	**Mononchus aquaticus** Coetzee, 1968	Aligarh, U.P. Chamoli, U.P. Ahmedabad, Gujrat
2.	**Prionchulus muscorum** (Dujardin, 1845) Wu & Hoeppli, 1929	Mussoorie, U.P. Chamoli, U.P.
3.	**Clarkus papillatus** (Bastian, 1865) Jairajpuri, 1970	Chamoli, U.P.
4.	**Clarkus oheri** (Mulvey , 1967) Jairajpuri, 1970	Mussoorie, U.P.
5.	**Coomansus parvus** (de Man, 1880) Jairajpuri & Khan, 1977	Mussoorie, U.P.
6.	**Coomansus indicus** Jairajpuri & Khan, 1977	Mussoorie, U.P.
7.	**Sporonchulus vagabundus** Jairajpuri, 1971	Bhubaneswar, Orissa.
8.	**Parahadronchus shakili** (Jairajpuri, 1969) Mulvey, 1978	Farrukhabad, U.P.
9.	**Oionchus obtusus** Cobb, 1913	Ahmedabad, Gujrat Bhubaneswar, Orissa Farrukhabad, U.P.

REFERENCES

ALTHERR, E. (1950). Les nematodes du parc national Suisse. Ergebn. Wiss. unters. Schweiz natn parks 3, 1-46.

ALTHERR, E. (1953). Nematodes du sol du jara vaudois francois I. Bull. Soc. Vaud. sci. nat. 65, 429-450.

ANDRASSY, I. (1958). Uber das system der Mononchiden (Mononchidae Chitwood, 1937; Nematoda). Annls hist. nat. mus. natn. hung. 50, 151-171.

ANDRASSY, I. (1976). Evolution as a basis for the systematization of nematodes. Pitman Publishing London, San Francisco, Melbourne, 288 pp.

BASTIAN, C. H. (1865). Monograph on the Anguillulidae, or free nematodes, marine, land, and freshwater; with descriptions of 100 new species. Trans. Linn. Soc. Lond. 25, 73-184.

BAQRI SAMER, Z. & JAIRAJPURI, M. S. (1973). Studies on Mononchida V. The mononchs of El Salvador with description of two new genera, Actus and Paracrassibucca. Nematologica 19, 326-333.

BUANGSUWON, D. K. & JENSEN, H. J. (1966). A taxonomic study of Mononchidae (Enoplida : Nemata) inhabiting cultivated areas of Thailand. Nematologica 12, 259-274.

CASSIDY, G. (1931). Some mononchs of Hawaii. Plrs. Rec. 35, 305-339.

CHITWOOD, B. G. (1937). A revised classification of the Nematoda, in "papers in Helminthology, 30 years Jubileum K. I. Skrjabin", Moscow, pp. 69-80.

CLARK, W. C. (1960 a). The oesophago-intestinal junction in the Mononchidae (Enoplida, Nematoda). Nematologica 5, 178-183.

CLARK, W. C. (1960 b). Redescription of Mononchus truncatus Bastian, M. papillatus Bastian, and Prionchulus muscorum (Dujardin)(Enoplida, Nematoda). Nematologica 5, 184-198.

CLARK, W. C. (1960 c). New Zealand Mononchidae (Enoplida, Nematoda) I. The genera Mononchus Bastian and Prionchulus Cobb, Nematologica 5, 199-214.

CLARK, W. C. (1960 d). The Mononchidae (Enoplida, Nematoda) of New Zealand II. The genus Iotonchus (Cobb, 1916) Altherr, 1950, Nematologica 5, 260-274.

CLARK, W. C. (1960 e). The Mononchidae (Enoplida, Nematoda) of New Zealand III. A review of the genus Cobbonchus Andrassy, 1958 with descriptions of new species. Nematologica 5, 275-284.

CLARK, W. C. (1961 a). The Mononchidae (Enoplida Nematoda) of New Zealand IV. The genus Mylonchulus (Cobb, 1916) Pennak, 1953, Nematologica 6, 1-6.

CLARK, W. C. (1961 b). A revised classification of the order Enoplida (Nematoda). N. Z. Jl Sci. 4, 123-150.

CLARK, W. C. (1962). Evolution within the family Mononchidae (Enoplida, Nematoda). Nematologica 7, 251-255.

CLARK, W. C. (1963). Notes on the Mononchidae (Nematoda) of the New Zealand region with descriptions of new species. N. Z. Jl Sc. 6, 612-632.

COBB, N. A. (1915). Notes on new genera and species of Nematodes. 4. subdivisions of Mononchus. J. parasit. 2, 195-196.

COBB, N. A. (1917). The Mononchs (Mononchus Bastian, 1866). A genus of free-living predatory nematodes. Soil Sci. 3, 431-486.

COETZEE, VICTORIA (1965). South African species of the genus Cobbonchus Andrassy, 1958 (Nematoda : Mononchidae). Nematologica 11, 281-290.

COETZEE, VICTORIA (1966). Species of the genus Granonchulus and Cobbonchus (Mononchidae), occurring in South Africa. Nematologica 12, 302-312.

COETZEE, VICTORIA (1967 a). Species of the genus Mylonchulus (Nematoda : Mononchidae) occurring in South Africa. Nematologica 12, 557-567.

COETZEE, VICTORIA (1967 b). Species of the genus Iotonchus (Nematoda : Mononchidae) occurring in South Africa.

Nematologica 13, 367-377.

COETZEE, VICTORIA (1966). South African species of the genera Mononchus and Prionchulus (Mononchidae) Nematologica 14, 63-76

COOMANS, A. & LOOF, P. A. A. (1970). Morphology and taxonomy of Bathyodontina (Dorylaimida) Nematologica 16, 180-196.

DE CONINCK, L. A. P. (1939). Les nematodes Libres de la Grotte de Han (Han-Sur-lesse, Belgique). Note de bio-speleologie. Bull. Mus. R. Hist. nat. Belg. 15, 1-40.

DUJARDIN, F. (1845). Histoire Naturelle des Helminthes ou Vers Intestinaux. Paris, 654 pp.

EROSHENKO, A. S. (1972). [New species of carnivorous nematode (Mononchida) in the Primorsk Territory] Zool. Zh. 51, 13-20.

EROSHENKO, A. S. (1975). [Ten new nematode species of the order Mononchida Jairajpuri, 1969, from Coniferous Forests of Primorye] . Inst. Biol. & Pedology, Far-easter Sci. Centre. Acad. Sci. U. S. S. R. Proc. New series, 26 (129), 152-169.

GOODEY, T. (1963). Soil and freshwater nematodes. Revised by J. B. Goodey. London, Methuen, 544 pp.

JAIRAJPURI, M. S. (1969). Studies on Mononchida of India. I. The Genera Hadronchus, Ictonchus and Miconchus and a revised classification of Mononchida, new order, Nematologica 15, 557-561.

JAIRAJPURI, M. S. (1970 a). Studies on Mononchida of India. II. The Genera Mononchus, Clarkus n. gen. and Prionchulus (Family Mononchidae Chitwood, 1937), Nematologica 16, 213-221.

JAIRAJPURI, M. S. (1970 b). Studies on Mononchida of India. III. The Genus Mylonchulus (Family Mylonchulidae Jairajpuri, 1969). Nematologica 16, 434-456.

JAIRAJPURI, M. S. (1971). Studies on Mononchida of India. IV. The Genera Spironchulus, Bathyodontus and Oionchus (Nematoda). Nematologica 17, 407-412.

JAIRAJPURI, M. S. & KHAN, W. U. (1977). Studies on Mononchida of India. IX. Further division of the Genus Clarkus Jairajpuri, 1970 with proposal of Coomansus n. gen. (Family Mononchidae Chitwood, 1937) and description of two new species. Nematologica 23, 89-96.

JENSEN, H. J. & MULVEY, R. H. (1968). Predaceous nematodes (Mononchidae) of Oregon. Ore. St. Monogr. Stud. Zool. No. 12, 1-57

KANAN, S. (1960). Soil nematodes from Madras city. J. Zool. Soc. India 12, 40-50.

KANAN, S. (1961 a). Further additions to the list of Mononchus from Madras city. J. Madras Univ. B.31, 59-62.

KANAN, S. (1961 b). Soil nematodes of the genera Mononchus and Mononchulus. J. Madras Univ. 31

KANAN, S. (1961 c). Nematodes of the genus Mononchus from Madras city. J. Madras Univ. 31, 69-74.

KHAN, W. U., JAIRAJPURI, M. S. & AHMAD, S. (1976). Studies on Mononchida of India X. Two new species of the Genus Miconchus Andrassy, 1958. Nematologica 24, 321-327.

KIRJANOVA, E. S. & KRALL, E. L. (1969). Plant parasitic nematodes and their control. Vol. 1, pub 1, House "Nauka", Leningrad, pp. 447.

DE MAN, J. G. (1876). Ondersoekingen Over Vrij in de aarde levende Nematoden. Tijdschr. ned. Dierk. Ver. 2, 78-196.

DE MAN, J. G. (1884). Die frei in der reinen Erde und in sussen wasser lebenden Nematode der niederlandischen Fauna. Eine systematische-faunistische Monographie Leiden. 206 pp.

MICOLETZKY, H. (1922). Die freilebende Erd-Nematoden. Arch. Naturgesch. Abt. A 87, 1-650.

MULVEY, R. H. (1961 a). The Mononchidae : A family of predacious nematodes I. Genus Mylonchulus (Enoplida : Mononchidae). Can. J. Zool. 39, 665-696.

MULVEY, R. H. (1961 b). The Mononchidae : A family of predaceous nematodes II. Genus Anatonchus (Enoplida : Mononchidae). Can. J. Zool. 39, 807-826.

MULVEY, R. H. (1963). The Mononchidae : A family of predaceous nematodes IV. Genus Iotonchus (Enoplida : Mononchidae). Can. J. Zool. 41, 79-96.

MULVEY, R. H. & JENSEN, H. J. (1967). The Mononchidae of Nigeria, Can. J. Zool. 45, 667-727.

MULVEY, R. H. (1976). Predaceous nematodes of the family Mononchidae from the Mackenzie and Porcupine river systems and Somerset Island, N. W. T. Canada. Can. J. Zool. 56, 1647-1666.

PENNAK, R. W. P. (1953). Freshwater invertebrates of the United States. New York. Ronald Press Co.

STEINER, G. & HEINLY, H. (1922). The possibility of control of Heterodera radicicola and other plant-injurious nemas by means of predatory nemas, specially by Mononchus papillatus, Bastian, J. Wash. Acad. Sci. 12, 367-386.

THORNE, G. (1927). The life history, habits and economic importance of some mononchs. J. agric. Res. 34, 265-266.

TSALOLIKHIN, S. YA. (1974). [New species of Nematodes commensals of Baikal Sponges] Zool. Zh. 53, 1081-1085.

TSALOLIKHIN, S. YA. (1975). [New nematodes from the abyssal zone of lake Baikal] Zool. Zh. 54, 771-775.

TU, H. V. & HOEPPLI, R. J. C. (1929). Free living nematodes from Fookien and Chekiang. Arch. Schiffs-U. Tropenhyg. 33, 35-43.

YEATES, G. W. (1967). Studies on nematodes from Dune sands. 3. Oncholaimidae, Ironidae, Alaimidae and Mononchidae. N. Z. Jl Sci. 10, 299-321.

TABLE - I

MYLONCHULUS LLLVEYI JAIRAJPURI, 1970

Populations	L mm	a	b	c	V	G_1	Gubernaculum (um)	Lip width (um)	Lip height (um)	Width of amphidial aperture (um)	Position of amphidial aperture from base of buccal cavity (um)	Position of nerve ring from anterior end of body (um)	Width of buccal cavity (um)	Length of buccal cavity (um)	Dorsal tooth from base of buccal cavity (um)	% of Dorsal tooth from base of buccal cavity	Rectum (um)	Tail length (um)
Total mean	0.89	29	2.9	21	77	17		17	6	3	15	79	10	19	16	85	12	37
Entire range 41♀♀	0.66-1.04	23-36	2.6-3.2	18-26	68-81	8-22		15-22	4-6	2-4	14-17	73-87	9-14	17-24	14-19	79-92	9-15	30-45
1) Mean	0.80	29	3.0	24	77	16		17	6	2	15	75	10	18	15	84	11	33
Range 4 ♀♀	0.74-0.87	27-31	3.0-3.2	23-26	76-78	13-20		17-18	5-6	2-3	15-16	74-77	10-11	17-19	14-16	82-88	10-12	30-35
2) Mean	0.91	32	3.0	23	77	18		17	6	2	15	80	9	20	17	85	12	36
Range 4 ♀♀	0.81-0.97	29-33	2.9-3.1	23-23	77-78	16-21		16-18	5-6	2-3	15-16	75-84	9-10	19-20	16-17	84-85	10-14	35-41
3) Mean	0.87	3.0	3.0	23	76	19		18	6	3	15	81	10	19	17	86	12	38
Range 5 ♀♀	0.82-0.93	28-33	2.8-3.2	20-26	68-79	17-22		17-21	6	2-4	15	77-86	9-10	18-20	15-17	85-88	10-14	36-41
4) Mean	0.91	31	2.8	21	79	13		17	5	3	15	82	11	19	17	87	13	41
Range 4 ♀♀	0.71-1.04	28-33	2.6-2.9	18-24	75-87	8-17		15-18	5-6	3-4	14-16	81-85	10-12	18-20	15-18	84-90	11-15	30-46
5) Mean	0.86	32	3.0	21	77	17		17	5	3	14	81	10	19	16	86	12	41
Range 6 ♀♀	0.78-0.94	30-33	2.9-3.2	19-22	76-78	13-20		16-18	4-5	3	14-15	73-86	9-10	18-19	15-17	84-88	10-14	39-43
6) Mean	0.94	33	3.1	23	77	16		16	6	2	15	84	10	19	16	86	10	40
Range 3 ♀♀	0.87-1.00	31-36	3.1-3.2	22-24	76-78	12-19		15-17	5-6	2-3	14-15	84-85	9-11	18-20	15-17	84-88	9-11	39-42
7) Mean	0.78	27	2.9	21	76	19		16	6	3	15	78	10	19	16	87	12	37
Range 5 ♀♀	0.66-0.84	23-30	2.6-3.1	19-22	75-78	15-22		15-17	5-6	2-3	15	73-82	9-11	18-19	15-17	85-88	10-13	35-39
(8) Mean	0.92	26	2.9	23	73	17		21	6	3	17	84	13	23	18	80	11	39
Range 33 ♀♀	0.91-0.94	25-27	2.8-3.1	21-26	67-81	15-21		19-22	6	3-4	15-17	84	12-14	22-24	18-19	79-81	10-13	36-42
(9) Mean	0.90	29	3.1	20	76	16		17	6	3	15	80	10	19	16	87	13	42
Range 4 ♀♀	0.87-0.93	28-31	3.0-3.2	19-21	75-79	13-20		15-18	5-6	2-3	15	78-84	10-11	18-20	15-17	84-92	11-14	42-43
(10) ♀ 1	0.91	28	3.1	21	74	17		18	5	4	16	82	10	19	17	90	14	42
♂ 1	0.89	26	2.9	22			39	19	5	4	16		10	19	17	90	13	40

Localities:

i) Company garden, Bareilly, Uttar Pradesh

ii) Gajrora farm, Haldwani, Nainital, Uttar Pradesh.

iii) Upper Fatehpur, Nainital, Uttar Pradesh

iv) Rishikesh, Saharanpur, Uttar Pradesh

v) Rishikesh, Saharanpur, Uttar Pradesh

vi) L. R. Brothers Nursery, Saharanpur, Uttar Pradesh

vii) Kangabok, Manipur

viii) Pantnagar, Nainital, Uttar Pradesh

ix) Baheri, Bareilly, Uttar Pradesh

x) Dharamshala, Himachal Pradesh.

TABLE - II

MYLONCHULUS BRACHYURUS (BUTSCHLI, 1873) ANDRASSY, 1958

Populations	L mm	a	b	c	V	G_1	G_2	T	Spicule length (um)	Gubernaculum (um)	Lip width (um)	Lip height (um)	Width of amphidial aperture (um)	Position of amphidial aperture from base of buccal cavity (um)	Position of nerve ring from anterior end of body (um)	width of buccal cavity (um)	Length of buccal cavity (um)	Dorsal tooth from base of buccal cavity (um)	% of Dorsal tooth of the length of buccal cavity	Rectum (um)	Tail length (um)
Total mean	1.03	25	3.0	41	66	12	11				21	5	4	16	96	14	24	19	82	17	25
Entire range 40 ♀♀	0.84-1.22	21-32	2.6-3.6	32-52	55-72	5-20	6-17				19-25	4-6	3-5	17-19	84-115	11-15	21-25	17-21	78-87	12-21	21-31
(1) Mean	0.99	24	3.0	42	65	14	13				24	5	4	19	100	15	24	20	83	18	23
(1) Range 10 ♀♀	0.90-1.09	21-26	2.8-3.3	36-45	55-67	10-19	10-17				22-25	5-6	4-5	18-21	98-103	14-15	24-25	19-21	79-87	15-20	21-24
(2) Mean	0.93	25	3.0	39	67	13	10				22	5	4	19	94	14	24	20	82	17	24
(2) Range 7 ♀♀	0.84-1.04	22-29	2.8-3.1	37-41	65-69	10-17	9-13				21-24	4-6	4	18-20	91-96	14-15	23-25	19-21	79-84	15-18	21-26
(3) Mean	0.92	25	3.2	35	64	14	12				19	5	3	18	89	13	22	18	81	14	26
(3) Range 3 ♀♀	0.84-1.04	24-27	3.0-3.6	32-41	64-65	11-20	10-16				19-21	5	3-5	18-19	84-93	13	21-22	18	80-85	14-15	25-26
(3) ♂	0.72	22	3.0	33				41	39	14	18	4	3	17	91	11	21	17	81	15	22
(4) Mean	1.15	27	3.2	39	65	17	15				20	5	4	17	99	12	23	18	80	15	24
(4) Range	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				20-21	4-5	3-4	17-18	98-100	12-13	22-24	18-19	79-81	15	24
(5) Mean	1.06	26	2.8	42	67	9	9				22	5	4	18	93	14	24	20	83	15	25
(5) Range 3 ♀♀	0.89-1.22	25-32	2.4-3.1	37-45	63-72	8-10	7-10				21-24	4-5	4	18	91-95	14	24-25	19-20	82-83	14-15	24-27
(5) ♂	1.21	31	2.9	44				35	35	13	24	5	4	18	96	14	24	20	83	15	27
(6) Mean	1.15	27	3.0	40	67	10	9				23	5	4	18	101	14	25	21	82	14	25
(6) Range 3 ♀♀	0.96-1.11	26-28	2.9-3.0	38-43	66-69	7-12	7-11				22-24	4-6	4	18-19	97-106	13-15	25	21	82	12-15	24-27
(7) Mean	1.02	25	3.1	35	66	13	13				24	5	4	18	109	14	24	20	82	20	30
(7) Range 4 ♀♀	0.96-1.08	24-26	2.9-3.6	32-39	65-66	13	12-14				24-25	5-6	4	18-19	101-115	14-15	25-25	19-21	81-83	20-21	30-31
(8) Mean	1.12	26	2.9	45	64	8	7				21	5	4	17	87	13	24	18	78	14	23
(8) Range 4 ♀♀	1.05-1.20	23-30	2.8-3.1	43-47	60-69	7-9	6-8				20.22	4-5	3-4	17-18	85-89	13-14	23-24	18-19	78	13-14	22-24
(9) Mean	1.14	27	3.2	49	64	7	6				23	5	4	19	105	14	25	21	85	21	23
(9) Range 2 ♀♀	1.10-1.18	26-29	3.1-3.3	46-52	64	6-8	5-7				22-24	4-6	4	18-19	105-106	14-15	24-25	21	84-87	20-22	22-24
(10) Mean	0.91	28	2.9	39	69	14	9				20	5	4	18	95	13	24	20	80	18	23
(10) Range 2 ♀♀	0.90-0.93	27-29	2.9	39-40	68-70	14-15	9-10				19-21	5-5	4	18-19	95-96	13-14	24-25	19-20	79-80	17-19	22-24

Localities:

i) Ranikhet, Almora, Uttar Pradesh

ii) Ranikhet, Almora, Uttar Pradesh

iii) Srinagar, Jammu & Kashmir

iv) Srinagar, Jammu & Kashmir

v) Company garden , Mussoorie, Uttar Pradesh

vi) Ranikhet, Almora, Uttar Pradesh

vii) Harmit Singh Marg, Mussoorie, Uttar Pradesh

viii) Bhawali, Nainital, Uttar Pradesh

ix) Ranikhet, Almora, Uttar Pradesh

x) Mussoorie, Uttar Pradesh.

Fig. 1

A - C **Mylonchulus hawaiiensis**

A - Head end,

B - Female gonads,

C - Female tail.

D - F **Mylonchulus contractus**

D - Head end,

E - Female gonads,

F - Female tail.

G - J **Mylonchulus mulveyi**

G - Head end,

H - Female gonad,

I & J-Female tails.

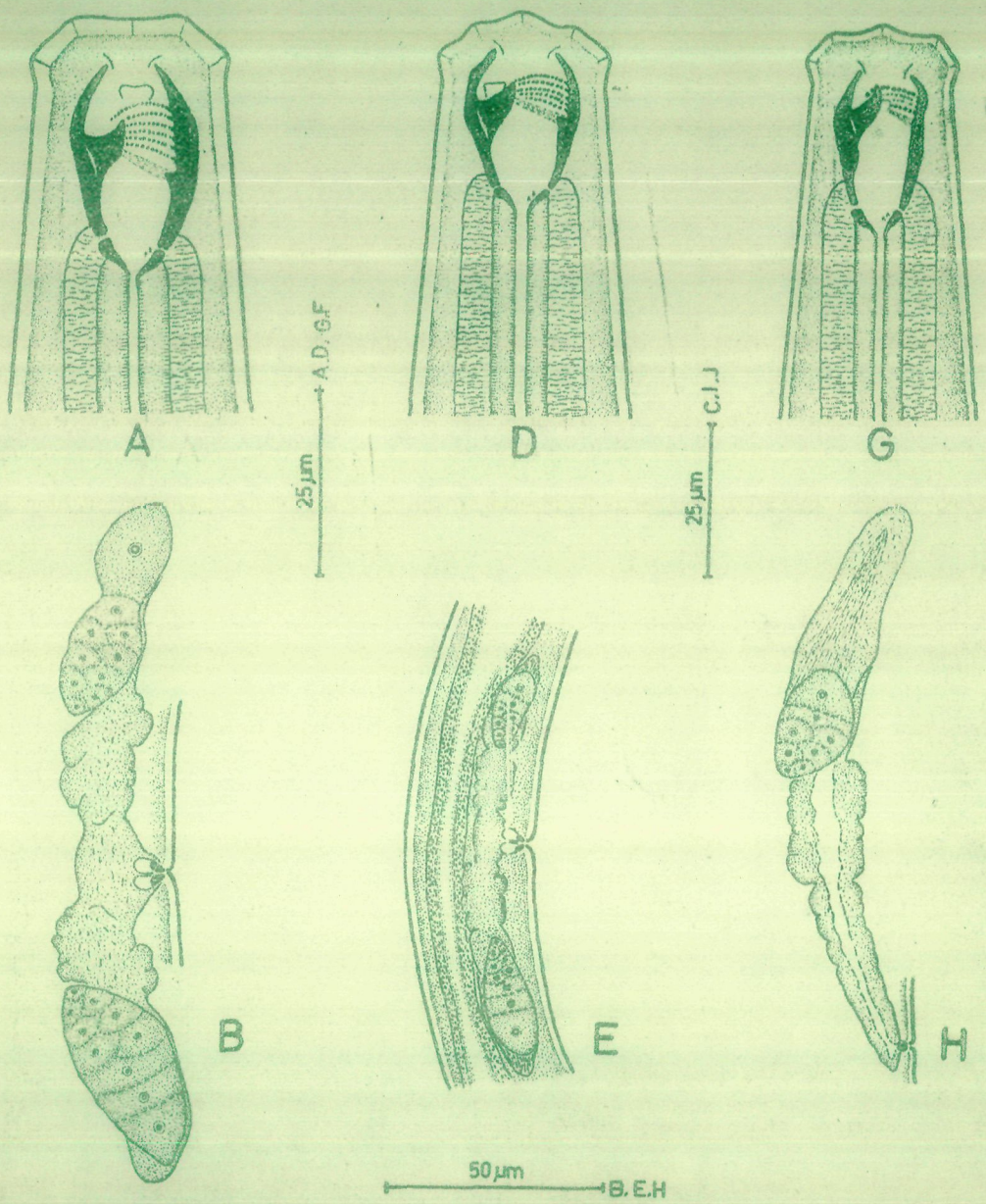

A
D
G
A.D. G.F
25 µm
C.I.J
25 µm
B
E
H
50 µm
B. E.H
C
F
I
J

Fig. 2

A - F Mylonchulus brachyurus

A - Head end,

B - Male gonads,

C - Female gonads,

D - Male tail,

E - Spicule,

F - Female tail.

G - H Mylonchulus index

G - Head end,

H - Female tail.

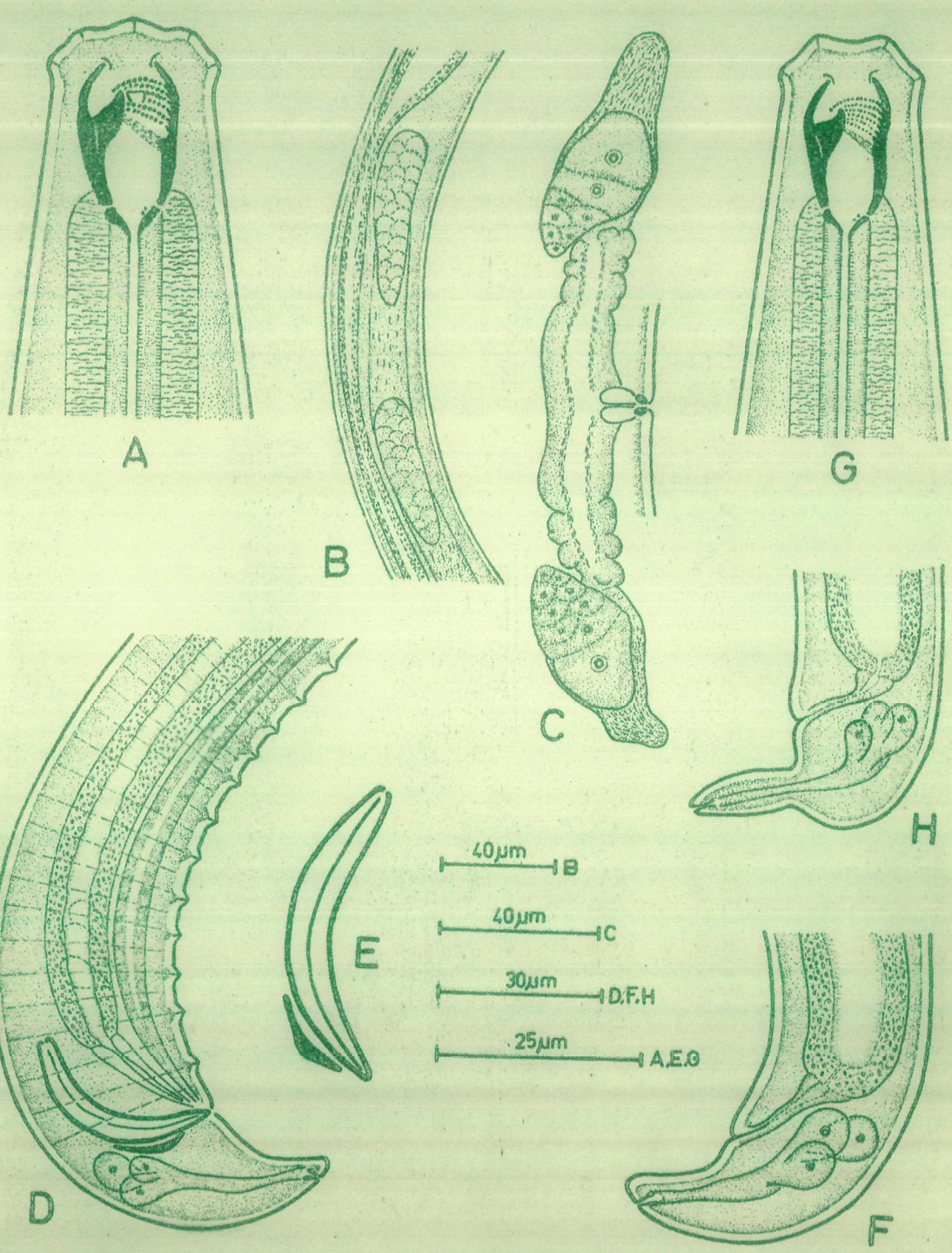


Fig. 11

Fig. 3

A - C Mylonchulus sigmaturus

A - Head, end,

B - Female gonads,

C - Female tail.

D - F Mylonchulus muradi

D - Head end,

E - Female gonad (anterior),

F - Female tail.

G - I Mylonchulus lacustris

G - Head end,

H - Female gonads,

L - Female tail.

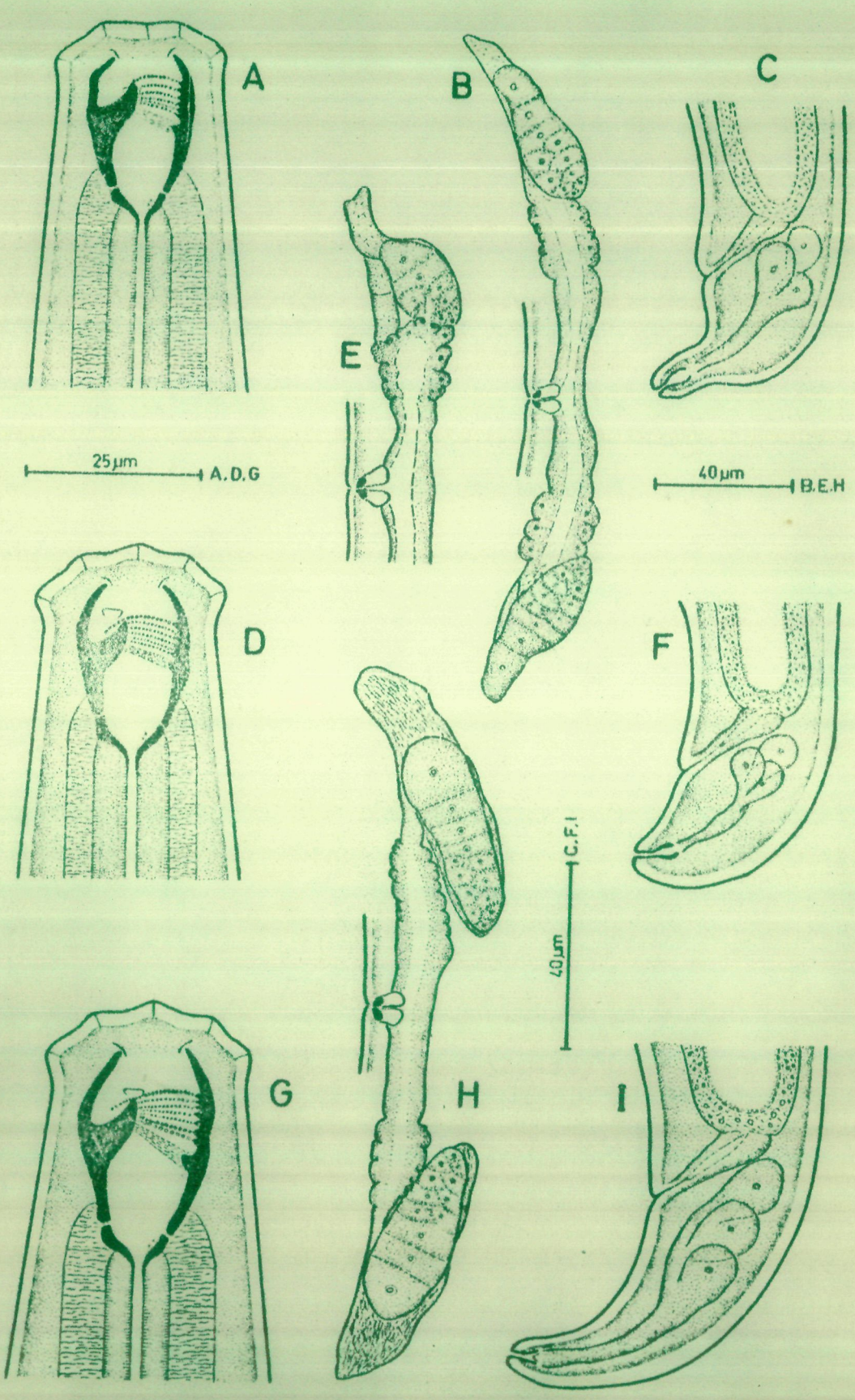

A
B
C
E
25µm
A.D.G
40µm
B.E.H
D
F
C.F.I
40µm
G
H
I

Fig. 4

Mylonchulus dentatus

A - Head end,

B - Female gonads,

C - Female tail.

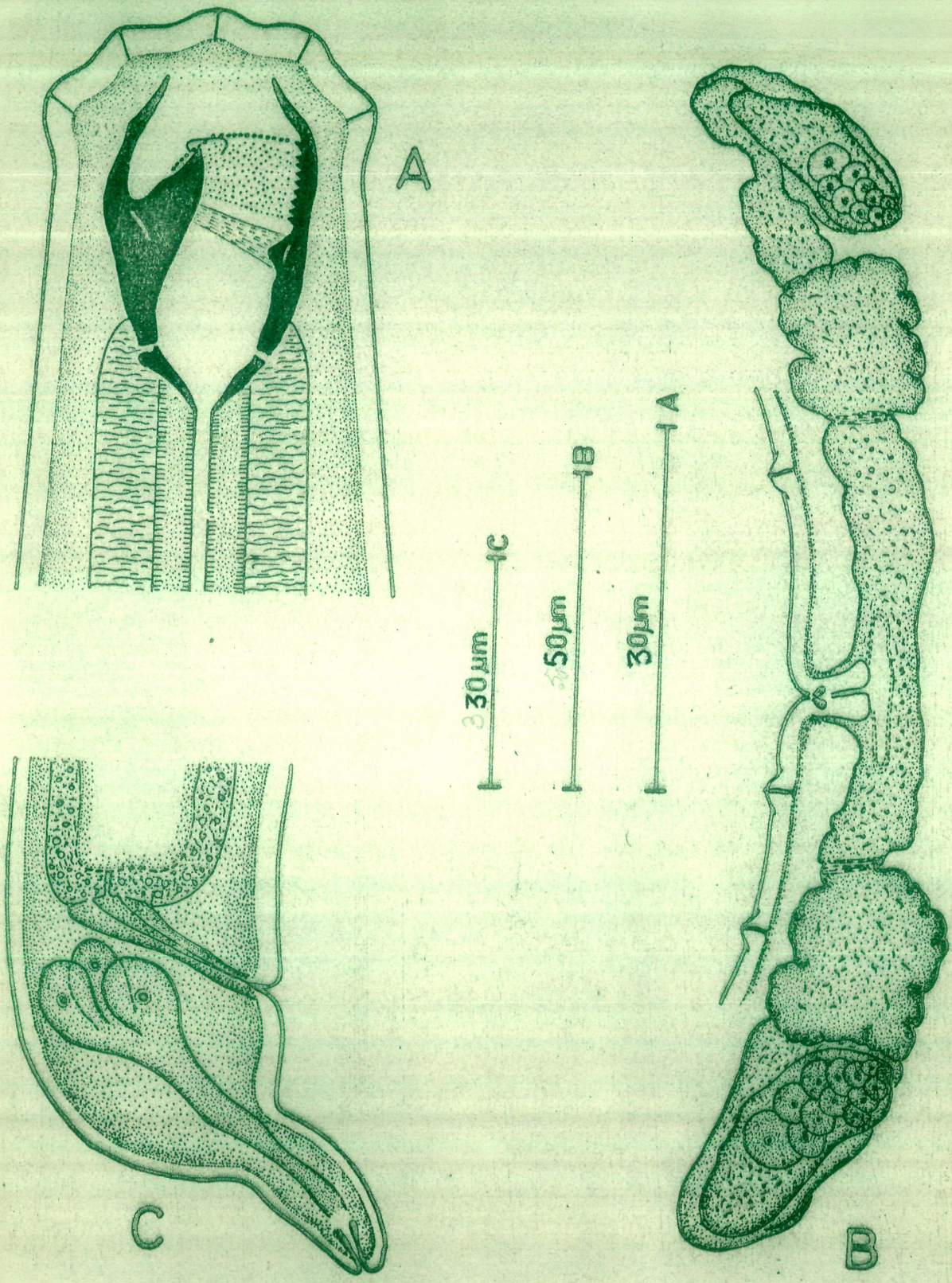

A
30µm
1C
50µm
1B
30µm
1A
C
B

Fig. 5

A - C Mylonchulus simlaensis n. sp.

A - Head end,

B - Female gonads,

C - Female tail.

D - F Mylonchulus ventralis n. sp.

D - Head end,

E - Female gonads,

F - Female tail.

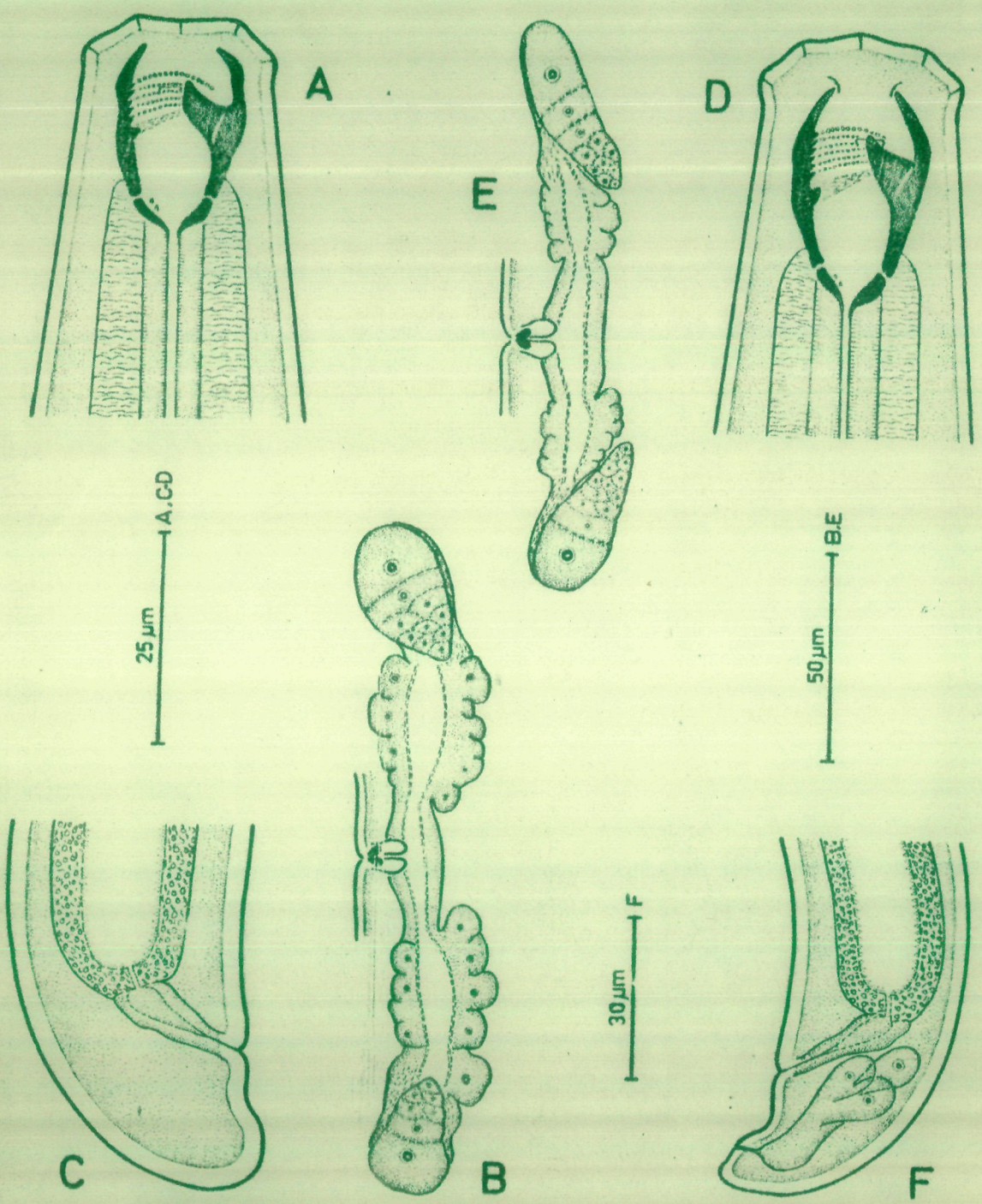

A
E
D
A.C-D
25 µm
B.E
50 µm
C
B
30 µm
F
F

Fig. 6

Mylonchulus mulveyi

Male

A - Head end.

B - Tail.

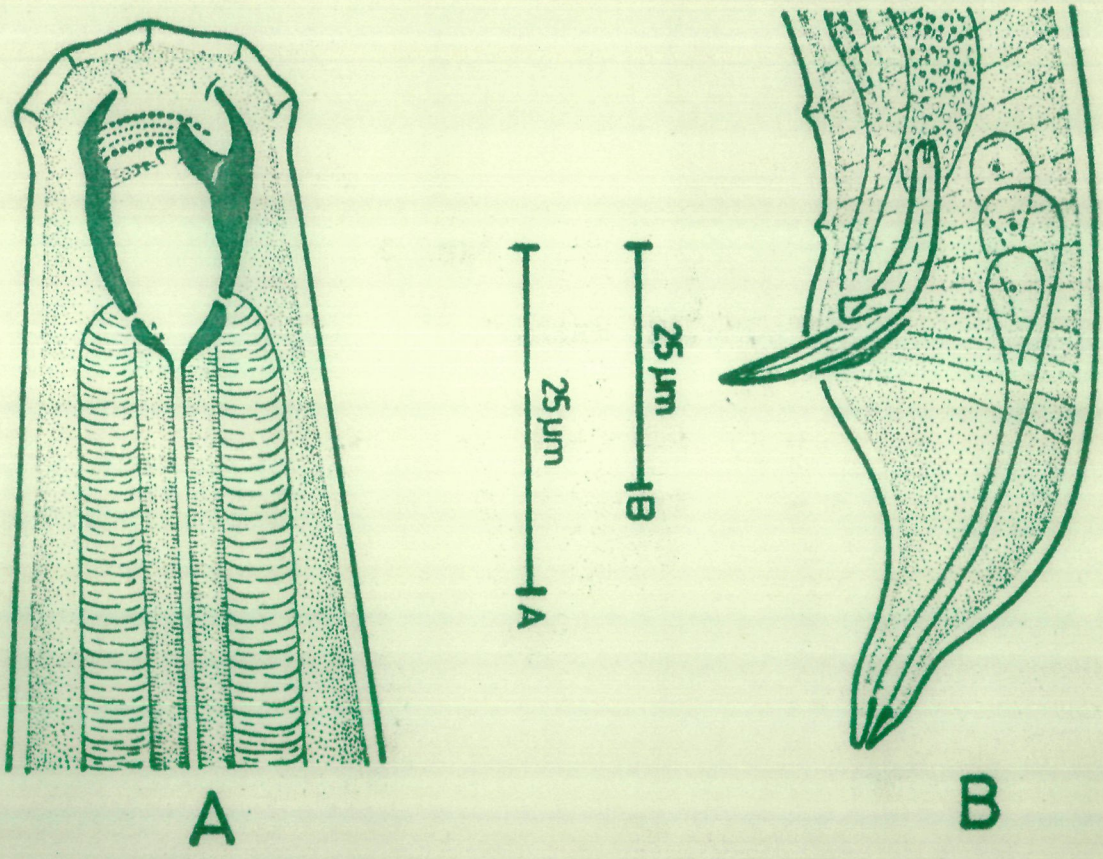

25 µm
B
25 µm
A
A
B

Fig. 7

A - C Iotonchus trichurus

A - Head end,

B - Female gonad,

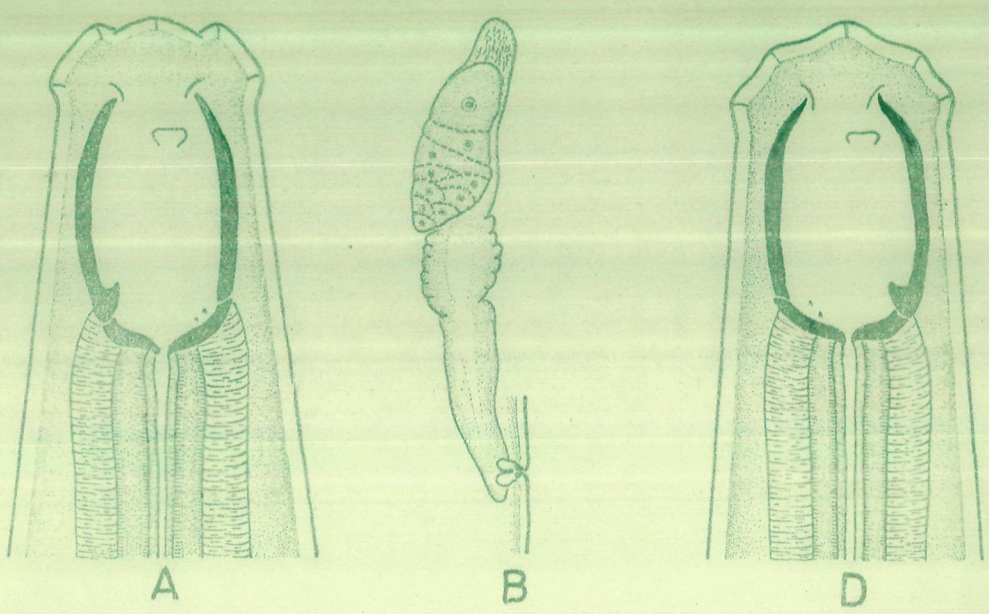
C - Female tail.

D - F Iotonchus indicus

D - Head end,

E - Female gonad (posterior),

F - Female tail.


A
B
D

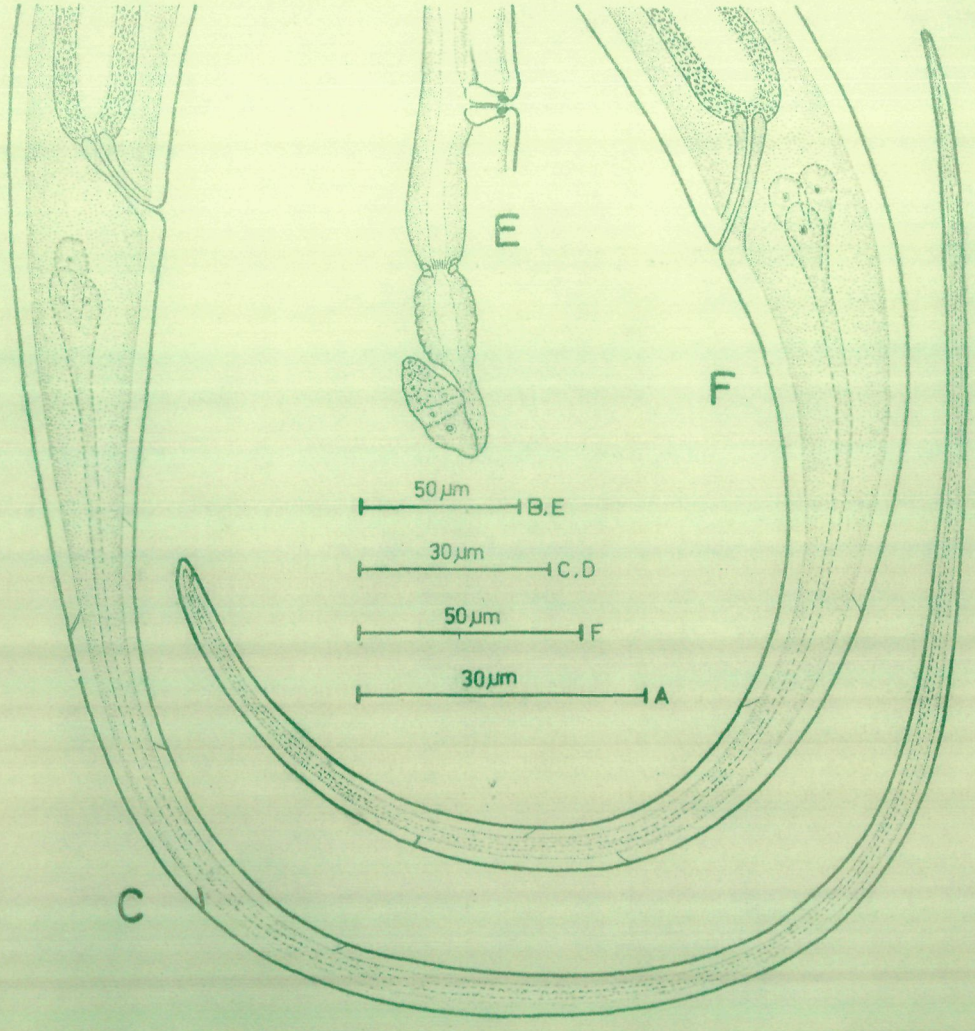

E
F
50 µm
B.E
30 µm
C.D
50 µm
F
30 µm
A
C

Fig. 8

Iotonchus parabasidontus

A - Head end of female,

B - Head end of male,

C - Female gonad (anterior),

D - Male tail,

E - Female tail,

F - Female tail tip.

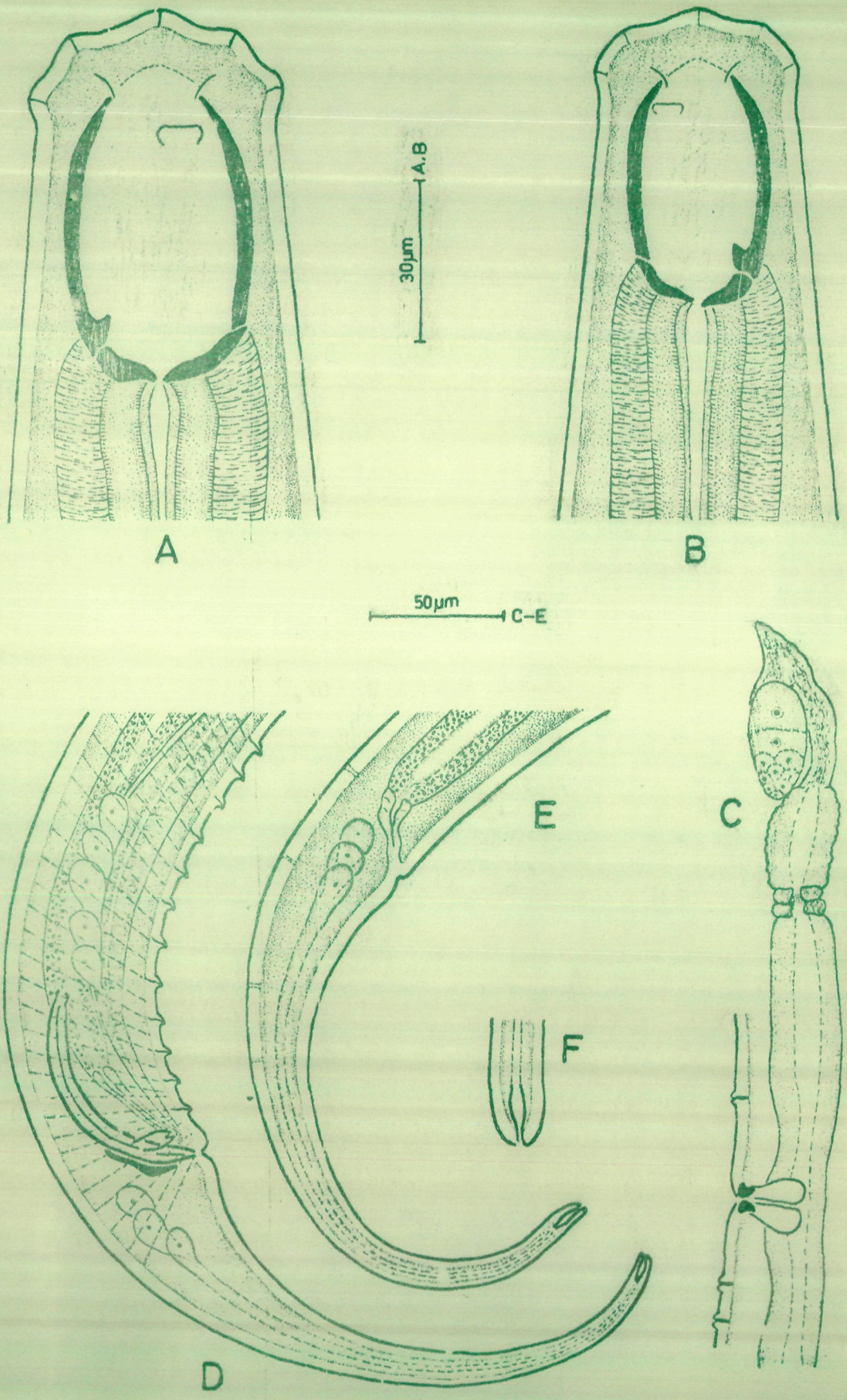

30µm
A-B
A
B
50µm
C-E
C
D
E
F

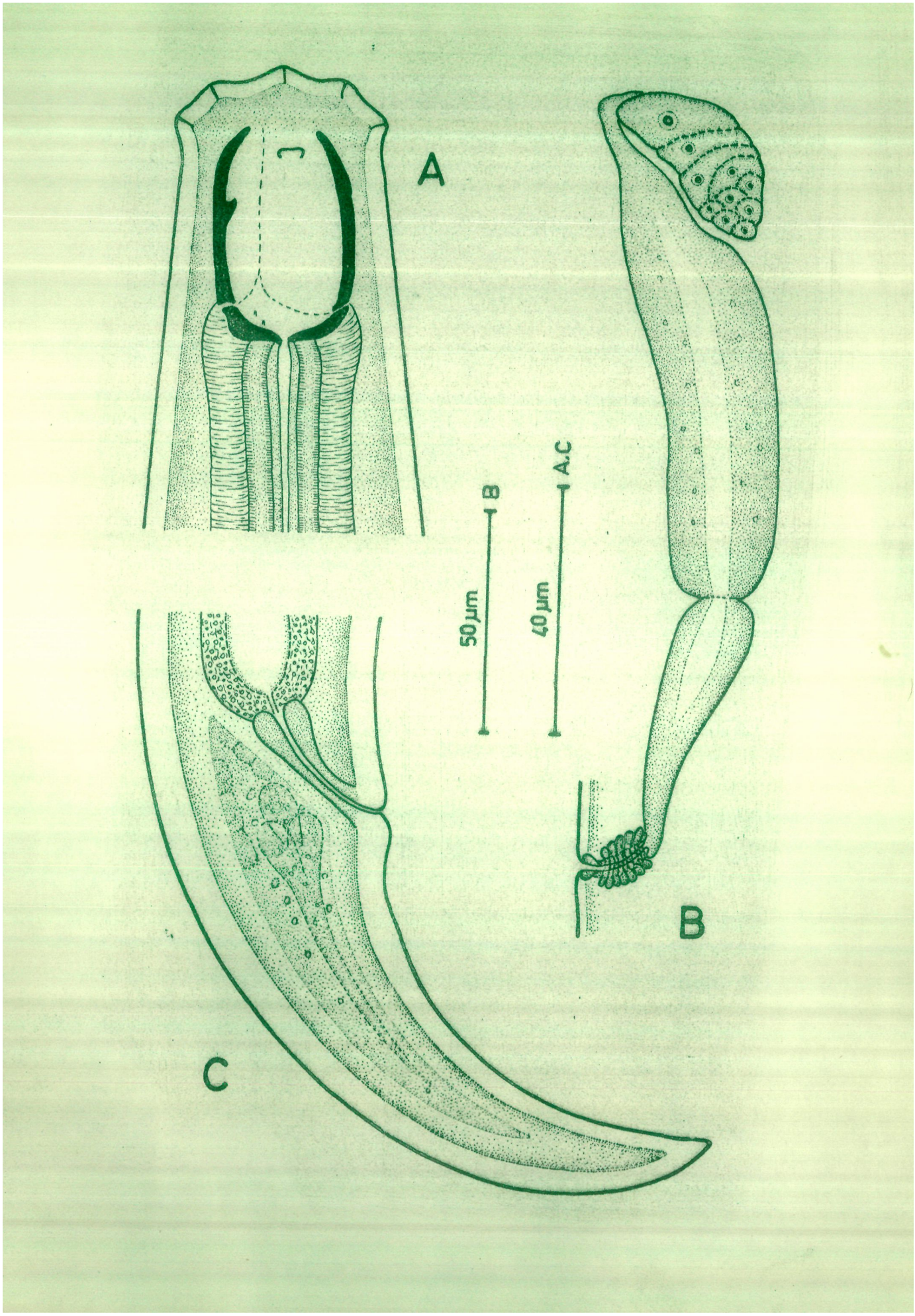
Fig. 9

Iotonchus jairi

A - Head end,

B - Female, gonad,

C - Female tail.


A
B
C
A.C
B
50 µm
40 µm